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Application No. PCT/IE 02/00085

Date of Filing 26/06/2002

Applicant ALLIANCE INVESTMENTS LIMITED of  
Monksland Industrial Estate, Athlone, County  
Westmeath, Ireland

Dated this 3 day of June 2003



*Claw O' Reilly*

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# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

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International Application No.

PCT/IE 02/00085

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26 JUN 2002

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Applicant's or agent's file reference  
(if desired) (12 characters maximum) 31025W0

<b>Box No. I TITLE OF INVENTION</b>	
A therapeutic bed	
<b>Box No. II APPLICANT</b>	
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<input type="checkbox"/> This person is also inventor.	
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O'CONNOR Donal H SCHUTTE Gearoid  of  CRUICKSHANK & CO., 1 Holles Street, Dublin 2, Ireland	
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Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application:* regional Office	international application: receiving Office
item (1) 26/06/2001	S2001/0589	IE		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): Item (1)

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

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ISA / EP

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## Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets:

request : 04  
description (excluding sequence listing part) : 17  
claims : 05  
abstract : 01  
drawings : 23  
sequence listing part of description :  
Total number of sheets : 50

This international application is accompanied by the item(s) marked below:

- ☒ fee calculation sheet
- ☐ separate signed power of attorney
- ☐ copy of general power of attorney; reference number, if any:
- ☐ statement explaining lack of signature
- ☐ priority document(s) identified in Box No. VI as item(s):
- ☐ translation of international application into (language):
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Figure of the drawings which should accompany the abstract: Fig 2

Language of filing of the international application: English

## Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

  
SCHUTTE Gearoid

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1. Date of actual receipt of the purported international application: <u>26 JUN 2002</u>	2. Drawings: <input checked="" type="checkbox"/> received: <input type="checkbox"/> not received:
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**"A Therapeutic Bed"**

This invention relates to therapeutic beds, and in particular to prone positioning therapeutic beds.

5

The invention particularly relates to prone positioning beds of the type described in our previous patent applications – publication Nos. WO 97/22323 and WO 99/62454 – the contents of which are incorporated herein by reference.

10 While the invention is primarily concerned with improvements to this type of prone positioning bed, some or all of the various improvements may have application to other types of therapeutic bed also.

**Summary of the Invention**

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According to the invention there is provided a therapeutic bed, including:

a base frame,

20

a patient support platform rotatably mounted on the base frame for rotational movement between a supine patient support position and an inverted prone patient support position,

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side rail means being provided along each side of the patient support platform,

30

each side rail means carrying one or more patient support pads for supporting a patient on the patient support platform when the patient support platform is in the prone patient support position,

locking means for releasably securing the patient support pads in a patient support position spaced-apart from and extending across the patient support platform,

- 2 -

characterised in that each side rail means is movable on the patient support platform between an engaged operative position extending above the patient support platform and a stored position below the patient support platform.

5

In one embodiment said rail means is pivotally mounted on the patient support platform for movement between the engaged position and the stored position.

10 In another embodiment means is provided for supporting the side rail means in an intermediate position between the engaged position and the stored position.

In another embodiment said support means is operable to support the side rail means in a position extending laterally outwardly from a side of the patient support platform in the intermediate position.

15

In a further embodiment the rail means locates beneath the patient support platform in the stored position.

20 In another embodiment a locking sensor is provided for each side rail means, said locking sensor being operatively connected to a rotational interlock which prevents rotation of the patient support platform unless the locking means for the patient support pads is correctly engaged and locked.

25 In another embodiment locking sensors are provided on the patient support platform which are engagable by the side rail means when the side rail means is in the engaged operative position.

In another embodiment the locking sensors comprise a pressure sensitive switch mounted on the patient support platform.

30

In a further embodiment the side rail means comprises a number of spaced-apart complementary pairs of side rail elements pivotally mounted on opposite sides of the patient support platform with associated locking straps engagable between the pair of rail elements to releasably lock the rail elements together in the engaged

- 3 -

operative position.

In another embodiment the side rail means comprises a number of side rail elements mounted spaced-apart along each side of the patient support platform, each side rail element including an inner rail part and an associated outer rail part interconnected by a pivot, a patient support pad mounted on the outer rail part, a bottom end of the inner rail part being pivotally mounted on the patient support platform, a pawl mounted by a pivot on the patient support platform having a slot for complementary engagement with associated spaced-apart teeth on the inner rail part to support the inner rail part in either an upright engaged position projecting upwardly of the patient support platform, an intermediate position in which the inner rail part extends laterally outwardly of the patient support platform or a stored position in which the inner rail part is located beneath the patient support platform.

In another embodiment counterbalance weights are provided for the patient support platform to counterbalance the weight of the rail means.

In another embodiment the counterbalance weights comprise a fixed counterbalance weight at a head end of the patient support platform and an adjustable counterbalance weight at a foot end of the patient support platform.

In another embodiment the patient support platform has a hinged torso panel on an underside of the patient support platform which is moveable on the patient support platform when the patient support platform is in a prone support position between a closed locked position and an open position, said torso panel having a patient viewing window.

In another embodiment a releasable catch means is provided for restricting outward movement of the torso panel away from the patient support platform when the locking means for the torso panel is disengaged.

In another embodiment the torso panel has a patient support cushion inboard of the viewing window, said cushion being removably mounted on the torso panel.



In another embodiment the viewing window is provided with ventilation holes or slots.

- 5 In another embodiment drive means is provided for rotating the patient support platform on the base frame.

In another embodiment position sensors are provided on the patient support platform to indicate the orientation of the patient support platform relative to the  
10 base frame, said position sensors being connected to a controller for the drive motor.

In another embodiment means is provided for locking the patient support platform on the base frame, said means comprising a slidable locking pin mounted on the  
15 base frame and engagable with an associated receiver on the patient support platform, the locking pin being longitudinally slidable between an extended engaged position and a retracted disengaged position, a sensor actuator collar being mounted on the locking pin, the sensor actuator co-operating with associated  
20 sensors to indicate whether the locking pin is in the engaged locking position or in the released position, said sensors being connected to a rotational controller for the patient support platform drive means to prevent rotation of the patient support platform when the locking pin is in the engaged position.

In another embodiment patient side support pads are adjustably mounted on the  
25 patient support platform by means of a carriage which is slidably mounted between a pair of rails on the patient support platform, means being provided for releasably clamping the carriage on the rails.

In another embodiment the bed has a patient support platform rotatably mounted  
30 on the base frame for rotation about a longitudinal axis of the patient support platform and means is provided for sensing the direction of rotation of the patient support platform on the base frame, said direction sensing means being connected to a controller for controlling rotation of the patient support platform, such that when the patient support platform is rotated in one direction between the supine patient

- 5 -

support position and the prone patient support position, the patient support platform is constrained to rotate in the opposite direction when returning from the patient prone support position to the patient supine support position.

5 In another embodiment a patient care line guide is provided at a head end of the patient support platform, said guide being carried on a support arm, each end of the support arm being connected by swivel mounts to slide bosses which are slidable on associated rails on the patient support platform.

10 In another aspect of the invention there is provided a side rail assembly for mounting along a side of a patient support platform of a therapeutic bed, comprising a rail with means for mounting the rail on the patient support platform such that the rail is movable between an engaged operative position and a stored position on the patient support platform.

15

In one embodiment of the invention the rail is pivotally mounted on the patient support platform for movement between the engaged position and the stored position.

20 In another embodiment means is provided for supporting the rail in an intermediate position between the engaged position and the stored position.

In a particularly preferred embodiment in the stored position the rail locates beneath the patient support platform.

25

In another embodiment the rail carries a patient support pad.

Conveniently the patient support pad may be movable on the rail between an in-use position extending outwardly of the rail a collapsed position against the rail for storage.

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In another aspect of the invention there is provided a locking pin arrangement for locking a patient support platform on a base frame of a therapeutic bed, said patient support platform being rotatable about a longitudinal axis of the bed,

- 6 -

comprising a locking pin mounted on one of the patient support platform and the base frame for engagement with a complementary receiver on the other of the patient support platform and the base frame, the locking pin having associated position sensors which cooperate with an actuator on the locking pin to indicate to a controller for the bed whether the pin is engaged with or released from the receiver.

Preferably also releasable retaining means is engagable with the locking pin to hold the locking pin in either the engaged or released positions. This conveniently may be provided by a spring-loaded ball which engages in associated detents in the locking pin.

In another aspect the invention provides a therapeutic bed having a patient support platform rotatably mounted on a base frame for rotation about a longitudinal axis of the patient support platform and means is provided for sensing the direction of rotation of the patient support platform on the base frame, said direction sensing means being connected to a controller for controlling rotation of the patient support platform, such that when the patient support platform is rotated in one direction between the supine patient support position and the prone patient support position, the patient support platform is constrained to rotate in the opposite direction when returning from the patient prone support position to the patient supine support position.

#### **Brief Description of the Drawings**

The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings in which:-

Fig. 1 is a perspective view of a prior art prone positioning therapeutic bed;

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Fig. 2 is an end elevational view of a rail assembly for a therapeutic bed according to the invention;

Fig. 3 is a side elevational view of the rail assembly;

Fig. 4 shows the rail assembly in an engaged in-use position;

5 Fig. 5 is an end elevational view showing the rail in an intermediate partially collapsed position;

Fig. 6 is an end elevational view showing the rail in a fully folded stored position;

10 Fig. 7 is a detail end elevational view showing a locking arrangement for the rail;

Fig. 8 is a side elevational view of the rail;

15 Fig. 9 is an end elevational view of the rail;

Fig. 10 is a detail end elevational view showing a locking arrangement for the rail;

20 Fig. 11 is a detail elevational view showing a pivot portion of the rail;

Fig. 12 is a detail elevational view showing another pivot portion of the rail;

25 Fig. 13 is a perspective view of the rail assembly;

Figs. 14-19 are various views illustrating a locking pin arrangement for a patient support platform of the therapeutic bed of the invention;

30 Fig. 20 is a an elevational view showing one end of a therapeutic bed of the invention incorporating a solenoid rotational interlock;

Fig. 21 is a detail side elevational view showing the mounting of the solenoid interlock on the bed;

Fig. 22 is an elevational view of the solenoid interlock;

Fig. 23 is an enlarged detail side elevational view similar to Fig. 21;

5 Fig. 24 is a detail elevational view of portion of a therapeutic bed of the invention illustrating a hand-held controller for a patient support platform of the bed;

10 Fig. 25 is a side sectional view showing the mounting of the controller on the bed;

Fig. 26 is a detail elevational view showing an end of the bed on which the controller is mounted;

15 Fig. 27 is a elevational view of a cam assembly for releasably locking patient support pads on a therapeutic bed of the invention;

Fig. 28 is a plan view of the cam assembly;

20 Fig. 29 is a side elevational view of the cam assembly;

Fig. 30 is an end elevational view of the cam assembly;

Fig. 31 is an end elevational view of the cam assembly;

25 Fig. 32 is a plan view of a safety catch assembly for a hinged panel on the patient support platform of a therapeutic bed according to the invention;

Fig. 33 is a sectional elevational view of the safety catch assembly;

30 Fig. 34 is a side elevational view of the safety catch assembly;

Figs. 35-37 are detail views showing portion of a patient support platform of a therapeutic bed according to the invention;

Fig. 38 is an exploded perspective view of a hinged panel of the patient support platform;

5 Figs. 39-43 are detail views illustrating portion of a therapeutic bed according to the invention incorporating rotational direction sensing means;

Fig. 44 is an elevational view of a foot end of the patient support platform of the therapeutic bed illustrating a counterbalance mounting arrangement;

10

Fig. 45 is a side, partially sectioned, elevational view of the foot end of the patient support platform shown in Fig. 44;

Fig. 46 is an elevational view of portion of the foot end of the patient support platform;

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Fig. 47 is an elevational view showing a head end of the patient support platform illustrating the mounting of a counterbalance weight thereon;

20 Fig. 48 is a side elevational view of the head end of the patient support platform shown in Fig. 47;

Fig. 49 is a detail elevational view of a tube guide mounted at the head end of the patient support platform;

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Fig. 50 is a detail elevational view of portion of the tube guide;

Fig. 51 is an elevational view of a tube guide holder for mounting the tube guide shown in Fig. 49 at the head end of the patient support platform;

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Fig. 52 is a side sectional elevational view of the tube guide holder;

Fig. 53 is a plan view showing a frame of the patient support platform; and

Fig. 54 is an underneath plan view of the frame for the patient support platform.

#### **Detailed Description of Preferred Embodiments**

5

Referring initially to Fig. 1 there is shown a prior art prone positioning therapeutic bed of the type described in our earlier Patent Application No. PCT/IE99/00049 (Publication No. WO99/62454) the contents of which are incorporated herein by reference. The therapeutic bed is indicated generally by the reference numeral 100 and comprises a patient support platform 107 rotatably mounted on a base frame 104 for rotation about a longitudinal pivot axis between a supine support position and a prone support position. A motor is operable to rotate the patient support platform. The base frame 104 is in turn mounted on a wheeled chassis 102 by pivot linkages 105 which allow tilting and raising and lowering of the base frame 104 on the chassis 102. Removable side rails 125 are releasably locked on the patient support platform 107. Patient support flaps 140, 141 extend between the side rails 125 and can be releasably locked together to secure a patient on the patient support platform 107 so that the patient support platform 107 can be rotated into a prone patient support position.

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In accordance with the present invention, and referring particularly to Figs. 2 to 13 of the drawings, there is illustrated a side rail assembly for a therapeutic bed according to the invention. The side rail assembly is for mounting on a patient support platform 2 of the bed and comprises a number of side rail elements 1 mounted spaced-apart along opposite sides 3 of the patient support platform 2. Typically three or four of the side rail elements 1 are mounted along each side of the patient support platform 2. Each side rail element 1 is movable on the patient support platform 2 between an engaged position holding a patient support pad 4 above and spaced away from and facing the patient support platform 2 through an intermediate position (Fig. 5) extending laterally outwardly of the patient support platform 2 and a stored position (Fig. 6) located beneath and against an underside of the patient support platform 2.

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Each side rail assembly 1 has an inner rail part 6 and an outer rail part 7 pivotally

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connected together. The inner rail part 6 has a pair of spaced-apart arms 6a, 6b interconnected at their bottom ends by a tubular sleeve 19 and interconnected at their outer ends by a pivot pin 8. The tubular sleeve 19 is rotatably mounted on a pivot bar 12 which passes through the sleeve 19 and is secured by brackets 20 on the side 3 of the patient support platform 2. The outer rail part 7 has a pair of spaced-apart arms 7a, 7b interconnected at their inner ends by a tubular collar 21 which is rotatably mounted on pivot pin 8 and interconnected at their outer ends by a pad mounting plate 9 which is pivotally attached by pivot pins 10 to each arm 7a, 7b. The patient support pad 4 is secured to the mounting plate 9.

Locking straps 23 are attached to a mounting ring 24 at an outer end of each pad mounting plate 9. Associated pairs of side rail elements mounted at opposite sides of the patient support platform 2 are interconnected in the engaged position by interlocking quick release fastener elements 25 on the locking straps 23 to securely retain the patient support pads 4 in the engaged position for supporting a patient when the patient support platform 2 is rotated into the prone support position. Thus a number of spaced-apart complementary pairs of side rail elements 1 are pivotally mounted on opposite sides of the patient support platform 2 with associated locking straps 23 engagable between the pair of side rail elements 1 to releasably lock the side rail elements and patient support pads 4 together in the engaged operative position.

It will be noted that inner rail part 6 is cranked intermediate its ends. A pawl 14 mounted by pivot 15 on the side 3 of the patient support platform 2 has a slot 16 for engagement with three associated teeth 17 circumferentially spaced-apart on an exterior of the sleeve 19 on the inner rail part 6 to support the inner rail part 6 in either an upright engaged position (Fig. 4), an intermediate position (Fig. 5) extending outwardly from the patient support platform 2, or a stored position (Fig. 6) in which the rail assembly 1 is housed beneath the patient support platform 2.

As can be seen in Figs. 2 and 5 when in the intermediate position the patient support pad 4 can be folded inwardly against the inner rail part 6 prior to storage beneath the patient support platform 2. A number of sensors 18 are provided in the form of pressure sensitive strips and connected to a rotational controller 26 for



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the therapeutic bed on which the rail assembly 1 is mounted to indicate when the rail elements 1 are in the engaged position, preventing rotation of the patient support platform if any rail element is not properly engaged and the pairs of patient support pads 4 securely locked together.

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Fig. 2 shows the side rail assembly 1 in all three positions of use and Figs. 4 to 6 show separately the side rail assembly 1 in the different positions of use.

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In use, when a patient is supported in a supine position on the patient support platform 2 the rail elements 1 can be stowed conveniently beneath the patient support platform 2. When it is necessary to turn the patient into a prone position, the rail elements 1 are swung into the engaged position and the pairs of patient support pads 4 which are mounted on opposite sides of the bed are locked together by the locking straps 23.

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Conveniently the locking straps 23 can be used to securely retain the pads 4 in the fold position, the locking straps 23 being engagable with the sides 3 of the patient support platform 2 by means of stud fasteners to both keep the locking straps 23 tidy and also to retain the support pads 4 in the folded position against the inner rail part 6 whilst stowed beneath the patient support platform 2.

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Referring now to Figs. 14 to 19 there is illustrated a locking pin arrangement indicated generally by the reference numeral 30 for a therapeutic bed of the invention. This has the function of manually locking the patient support platform on the base frame. In this case the locking pin assembly 30 comprises a locking pin 31 mounted on the base frame and engagable with an associated receiver (not shown) on the patient support platform. The locking pin 31 is longitudinally slidable between an extended engaged position as shown in Fig. 14 and a retracted disengaged position. A sensor actuator collar 32 is mounted on the locking pin 31 and secured thereto by a retaining pin 33. This sensor actuator 32 cooperates with associated sensors 34 to indicate whether the locking pin 31 is in the engaged locking position or in the released position. The sensors 34 are operatively connected to the rotational

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controller 26 to prevent rotation of the patient support platform 3 unless the locking pin 31 is disengaged. A pair of spaced-apart detents 35 are provided in the locking pin 31 and cooperate with a spring-loaded ball 36 to securely hold the locking pin 31 in either the engaged or released positions.

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In use, the sensors 34 communicate with a controller for the bed to indicate whether the locking pin 31 is engaged or released in order to block rotation of the patient support platform if the locking pin is engaged.

- 10 Referring now to Figs. 20 to 22 there is illustrated an arrangement of a prone release solenoid indicated generally by the reference numeral 40 for a therapeutic bed of the invention. The solenoid 40 is engagable between the patient support platform and the base frame of the therapeutic bed and is connected to a controller for controlling rotation of the patient support platform on the base frame such that the patient
- 15 support platform is prevented from rotating on the base frame until all the safety checks and protocols have been properly carried out to ensure that the patient is properly secured on the patient support platform before rotation of the patient support platform into the prone position.

- 20 Referring now to Figs. 24 and 25, a hand-held controller 50 for rotating the patient support platform 2 is shown. This is mounted in a support clip 51.

Referring now to Fig. 26 there is shown an end casing forming portion of a therapeutic bed of the invention indicated generally by the reference numeral 60.

- 25 This incorporates a touch screen assembly 61 for viewing data and for entering instructions to control rotation and positioning of the patient support platform 2.

- Referring now to Figs. 27 to 31 there is shown a cam locking arrangement indicated generally by the reference numeral 70 for positioning and releasably
- 30 locking side patient support pads on the patient support platform 2 such as the longitudinal support pads which extend down the side of a patient on the patient support platform 2. The cam arrangement 70 comprises a carriage 71 which is slidably mounted between a pair of rails 72, 73 on the patient support platform. The rails 72, 73 extend transversely across the patient support platform 2 between

opposite sides 3 of the patient support platform 2 roughly mid-way along the patient support platform 2. Locking strips 75 are mounted along a top of each rail 72, 73 and incorporate a series of spaced-apart grooves 76 which are engagable with associated projections 77 on an underside of the carriage 71 to securely retain the carriage 71 in any desired set position on the patient support platform. A locking shaft 78 extends between the rails 72, 73 and projects upwardly through an opening 79 in the carriage 71. A flange 80 at a lower end of the locking shaft 78 is engagable with an underside of the rails 72, 73. A cam 81 is mounted by a pivot pin 82 at an upper end of the locking shaft 78 and can be moved by means of an actuating handle 83 to clamp or release the carriage 71 on the rails 72, 73. An arm 85 on the carriage 71 carries the patient support pads having a tubular sleeve 86 for reception of a mounting rod on the pad. A spring loaded locking bolt 87 engages the mounting rod to retain the mounting rod in the sleeve 86.

Referring in particular to Figs. 32 to 38 there is shown a hinged torso panel indicated generally by the reference numeral 150 for mounting on the patient support platform. The torso panel 150 is one of two panels of the patient support platform, as described in our earlier application, which can be opened for access to the patient in the prone position. Each has a flap shut locking mechanism as previously described. The panel 150 has a generally rectangular frame 151 upon which is mounted a clear perspex viewing panel 152 which is sandwiched between a foam support 157 and an outer trim element 158 which are secured to the frame 151. On an opposite side of the frame 151 a two-part foam cushion 153 is provided having an outer part 154 with an opening 155 into which an inner foam cushion part 156 is removably mounted. Thus when the patient support platform 2 is in the prone position the panel 150 may be opened and the inner foam part 156 removed and then the panel 150 closed again allowing viewing of the patient through the viewing panel 152. It will be noted that the perspex panel 152 is perforated to allow ventilation to the patient to minimise the possibility of bed sores. Medical staff like to be able to view a patient when in the prone position. Even if it is necessary to return the patient support platform to the supine position in an emergency the perspex panel 152 will support the patient temporarily and the inner foam cushion part 156 can be reinserted later.

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In addition to the slap shut locking mechanism for the torso panel 150 a safety catch indicated generally by the reference numeral 160 is also provided. The safety catch 160 has a rocker catch bar 161 for engagement with an associated tongue 162 mounted at a free end of the torso panel 150. The rocker catch bar 161 is secured on a rocking plate 163 housed within a frame element 164 of the patient support platform 2 behind a retaining cover 165. Springs 166 mounted on support posts 167 urge the rocker plate 163 upwardly against an inside face of the cover 165. The rocker catch bar 161 is thus able to rock back and forth against spring pressure to allow the tongue 162 to engage or disengage from the rocker catch bar 161. The springs 166 will always urge the rocker plate 163 flat against the cover 165 and thus position the rocker catch bar 161 in a neutral upright position as shown. When opening the torso panel 150 the rocker catch bar 161 is pivoted away from the tongue 162 to release the torso panel 150 which can then be pivoted into an open position. Upon closing the torso panel 150 the tongue 162 engages and deflects the rocker catch bar 161 to locate beneath the catch bar 161. if the slap shut mechanism for the torso panel 150 does not engage for some reason and the patient support platform is subsequently rotated away from the prone position towards the supine position the torso panel 150 will drop open. However the tongue 162 will catch on the catch bar 161 preventing inadvertent opening of the torso panel 150. Pairs of locking spigots 185 project outwardly of a pivot boss 186 at each end of the arm 181. The locking spigots 185 engage in complementary slots 187 in the inside face of the slide boss 183. Each pivot boss 186 has a central through hole 188 which slides onto a locking stud 189 which threadedly engages through a side wall of the slide boss 183. A locknut (not shown) engages an outer end 190 of the stud 189 to lock the pivot boss 186 on the slide boss 183 and lock the slide boss 183 on the rail 184.

Referring now in particular to Figs. 39 to 43, there is illustrated a rotational direction sensor indicated generally by the reference numeral 90 for a therapeutic bed according to the invention. The direction sensor 90 has a rocker arm 91 with a central pivot 92 about which the rocker arm 91 pivots. Wings 93 at opposite ends of the rocker 91 are engagable with a stop 94 to define pivot limits for the rocker arm 91. A spring 95 holds the wing 93 at one end of the arm 91 against the stop 94. The direction sensor 90 is mounted at one end of a therapeutic bed such that

as the patient support platform 2 rotates on the base frame an actuator on the patient support platform 2 engages and flips over the rocker arm 91 which movement is detected by sensors 98 connected to the controller 26 for the therapeutic bed to give an indication of the direction in which the patient support platform 2 turns when moving between a supine and a prone patient support position. Thus, when subsequently returning the patient support platform 2 from the prone support position to the supine support position, the controller 26 will reverse the drive to retrace the rotational path followed by the patient support platform 2.

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Referring in particular to Figs. 44 to 48 an arrangement of counterbalance weights for the patient support platform 2 will be described. These alleviate strain on the drive motor for the patient support platform 2 particularly when the side rails 1 are folded in the stored position beneath the patient support platform 2. Adjustable counterbalance weights 170 comprising a number of separate segments are removably mounted on support arms 171 on the end ring 175 at a foot end of the patient support platform 2 and retained by locknuts which are engagable with one or more of the arms 171. A fixed counterbalance weight 174 is mounted on an end ring 176 at a head end of the patient support platform.

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Referring in particular to Figs. 47 to 52 a tube guide 180 is shown. The tube guide 180 is carried on a U-shaped support arm 181. Inner ends of the arm 181 are connected by swivel mounts 182 to slide bosses 183 which are vertically slidable on associated rails 184 on the end ring 176 at the head end of the patient support platform 2. Pairs of locking spigots 185 project outwardly of a pivot boss 186 at each end of the arm 181. The locking spigots 185 engage in complementary slots 187 in the inside face of the slide boss 183. Each pivot boss 186 has a central through hole 188 which slides onto a locking stud 189 which threadedly engages through a side wall of the boss 183. A lock nut engages an outer end 190 of the stud 189 to lock the pivot boss 186 on the slide boss 183 and lock the slide boss 183 on the rail 184.

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Figs. 53 and 54 illustrate a frame forming portion of the patient support platform. The frame for the patient support platform 2 essentially comprises a pair of side

members 3 extending between the end rings 175, 176. The rails 72, 73 extend transversely between the sides 3 and have hinges 192 for mounting the torso panel 150 in a head opening 193 and a foot panel in a foot opening 194. A cross piece 195 adjacent a head end has through holes 196 for reception of mounting rods 5 upon which a head support 197 is mounted. A head support 197 is longitudinally slidable on the rods.

The invention is not limited to the embodiments hereinbefore described which may be varied in both construction and detail within the scope of the appended claims.

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**CLAIMS**

1. A therapeutic bed, including:

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a base frame,

a patient support platform rotatably mounted on the base frame for rotational movement between a supine patient support position and an inverted prone patient support position,

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side rail means being provided along each side of the patient support platform,

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each side rail means carrying one or more patient support pads for supporting a patient on the patient support platform when the patient support platform is in the prone patient support position,

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locking means for releasably securing the patient support pads in a patient support position spaced-apart from and extending across the patient support platform,

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characterised in that each side rail means is movable on the patient support platform between an engaged operative position extending above the patient support platform and a stored position below the patient support platform.

2. A therapeutic bed as claimed in claim 1 wherein said rail means is pivotally mounted on the patient support platform for movement between the engaged position and the stored position.

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3. A therapeutic bed as claimed in claim 1 or claim 2 wherein means is provided for supporting the side rail means in an intermediate position between the engaged position and the stored position.

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4. A therapeutic bed as claimed in claim 3 wherein said support means is operable to support the side rail means in a position extending laterally outwardly from a side of the patient support platform in the intermediate position.
- 5 5. A therapeutic bed as claimed in any preceding claim wherein the rail means locates beneath the patient support platform in the stored position.
- 10 6. A therapeutic bed as claimed in any preceding claim wherein a locking sensor is provided for each side rail means, said locking sensor being operatively connected to a rotational interlock which prevents rotation of the patient support platform unless the locking means for the patient support pads is correctly engaged and locked.
- 15 7. A therapeutic bed as claimed in claim 6 wherein locking sensors are provided on the patient support platform which are engagable by the side rail means when the side rail means is in the engaged operative position.
- 20 8. A therapeutic bed as claimed in claim 6 or 7 wherein the locking sensors comprise a pressure sensitive switch mounted on the patient support platform.
- 25 9. A therapeutic bed as claimed in any preceding claim wherein the side rail means comprises a number of spaced-apart complementary pairs of side rail elements pivotally mounted on opposite sides of the patient support platform with associated locking straps engagable between the pair of rail elements to releasably lock the rail elements together in the engaged operative position.
- 30 10. A therapeutic bed as claimed in any preceding claim wherein the side rail means comprises a number of side rail elements mounted spaced-apart along each side of the patient support platform, each side rail element including an inner rail part and an associated outer rail part interconnected by a pivot, a patient support pad mounted on the outer rail part, a bottom



5 end of the inner rail part being pivotally mounted on the patient support platform, a pawl mounted by a pivot on the patient support platform having a slot for complementary engagement with associated spaced-apart teeth on the inner rail part to support the inner rail part in either an upright engaged position projecting upwardly of the patient support platform, an intermediate position in which the inner rail part extends laterally outwardly of the patient support platform or a stored position in which the inner rail part is located beneath the patient support platform.

10 11. A therapeutic bed as claimed in any preceding claim wherein counterbalance weights are provided for the patient support platform to counterbalance the weight of the rail means.

15 12. A therapeutic bed as claimed in claim 11 wherein the counterbalance weights comprise a fixed counterbalance weight at a head end of the patient support platform and an adjustable counterbalance weight at a foot end of the patient support platform.

20 13. A therapeutic bed as claimed in any preceding claim wherein the patient support platform has a hinged torso panel on an underside of the patient support platform which is moveable on the patient support platform when the patient support platform is in a prone support position between a closed locked position and an open position, said torso panel having a patient viewing window.

25 14. A therapeutic bed as claimed in claim 13 wherein a releasable catch means is provided for restricting outward movement of the torso panel away from the patient support platform when the locking means for the torso panel is disengaged.

30 15. A therapeutic bed as claimed in claim 13 or 14 wherein the torso panel has a patient support cushion inboard of the viewing window, said cushion being removably mounted on the torso panel.

16. A therapeutic bed as claimed in any of claims 13 to 15 wherein the viewing window is provided with ventilation holes or slots.
- 5 17. A therapeutic bed as claimed in any preceding claim wherein drive means is provided for rotating the patient support platform on the base frame.
- 10 18. A therapeutic bed as claimed in claim 15 wherein position sensors are provided on the patient support platform to indicate the orientation of the patient support platform relative to the base frame, said position sensors being connected to a controller for the drive motor.
- 15 19. A therapeutic bed as claimed in any preceding claim wherein means is provided for locking the patient support platform on the base frame, said means comprising a slidable locking pin mounted on the base frame and engagable with an associated receiver on the patient support platform, the locking pin being longitudinally slidable between an extended engaged position and a retracted disengaged position, a sensor actuator collar being mounted on the locking pin, the sensor actuator co-operating with associated sensors to indicate whether the locking pin is in the engaged locking position or in the released position, said sensors being connected to a rotational controller for the patient support platform drive means to prevent rotation of the patient support platform when the locking pin is in the engaged position.
- 20 20. A therapeutic bed as claimed in any preceding claim wherein patient side support pads are adjustably mounted on the patient support platform by means of a carriage which is slidably mounted between a pair of rails on the patient support platform, means being provided for releasably clamping the carriage on the rails.
- 25 30 21. A therapeutic bed as claimed in any preceding claim having a patient support platform rotatably mounted on the base frame for rotation about a longitudinal axis of the patient support platform and means is provided for sensing the direction of rotation of the patient support platform on the base

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frame, said direction sensing means being connected to a controller for controlling rotation of the patient support platform, such that when the patient support platform is rotated in one direction between the supine patient support position and the prone patient support position, the patient support platform is constrained to rotate in the opposite direction when returning from the patient prone support position to the patient supine support position.

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22. A therapeutic bed as claimed in any preceding claim wherein a patient care line guide is provided at a head end of the patient support platform, said guide being carried on a support arm, each end of the support arm being connected by swivel mounts to slide bosses which are slidable on associated rails on the patient support platform.

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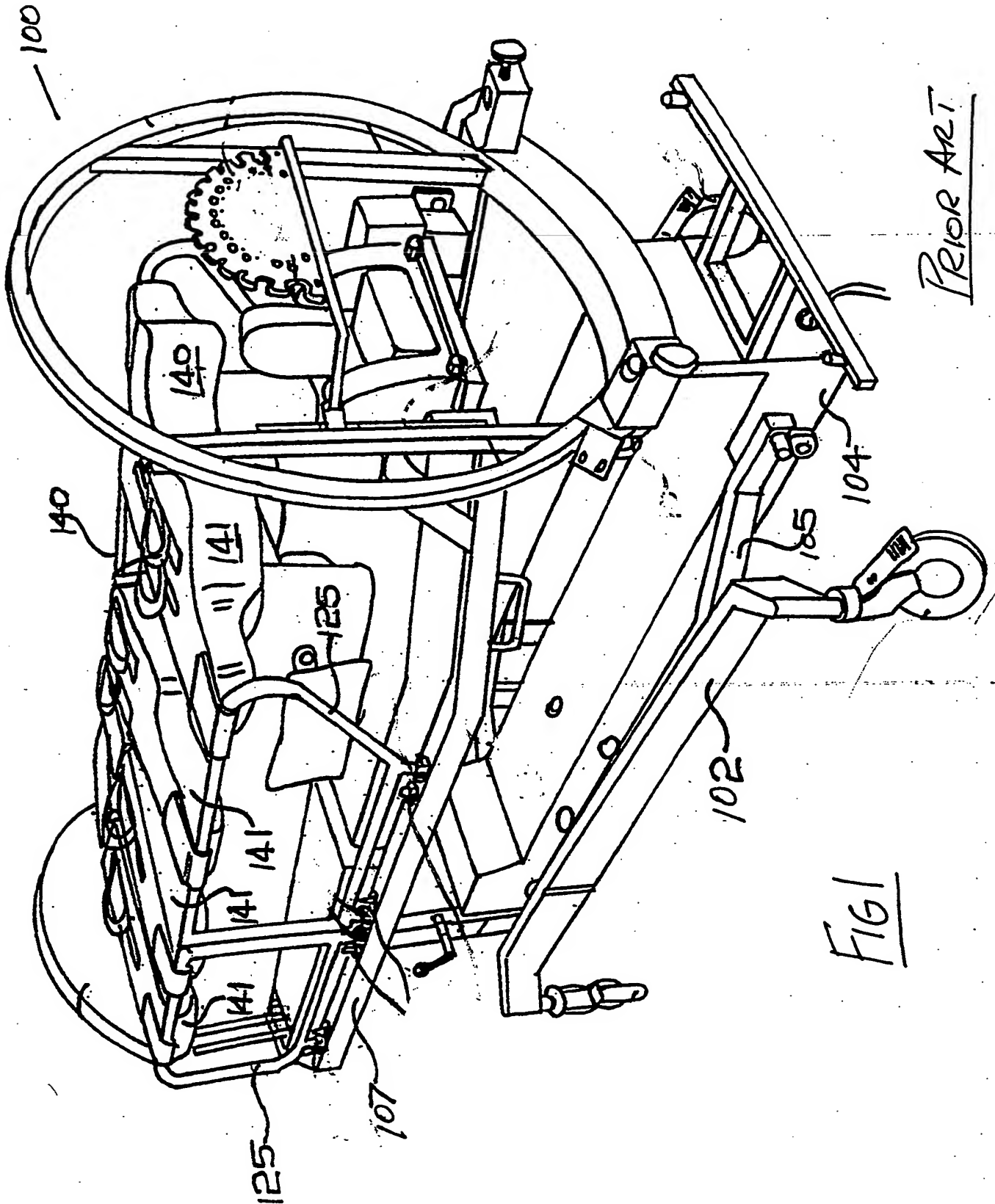
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**ABSTRACT****"A Therapeutic Bed"**

5 (Fig. 2)

A therapeutic bed has a patient support platform (2). A side rail assembly (1) is mounted at each side of the patient support platform (2). Each side rail assembly (1) is pivotally mounted on the patient support platform (2) for movement between a  
10 patient engaging position extending over the patient support platform (2), through an intermediate position extending laterally outwardly of the patient support platform (2) and a stored position located beneath the patient support platform (2).

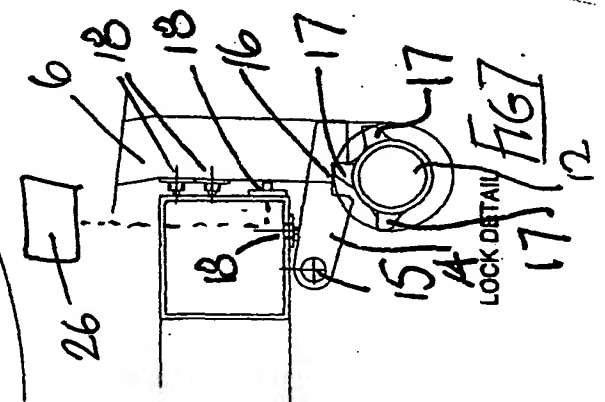
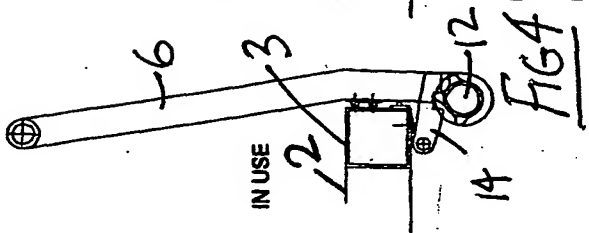
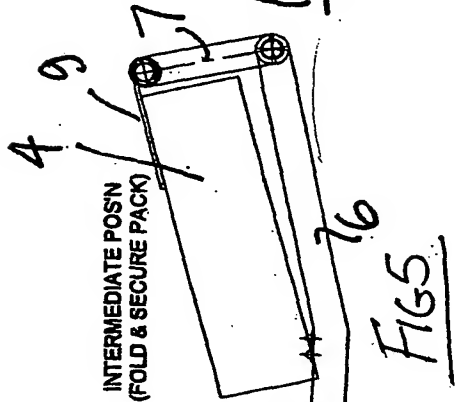
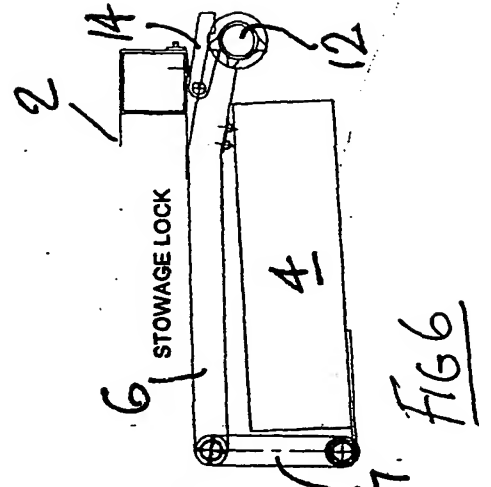
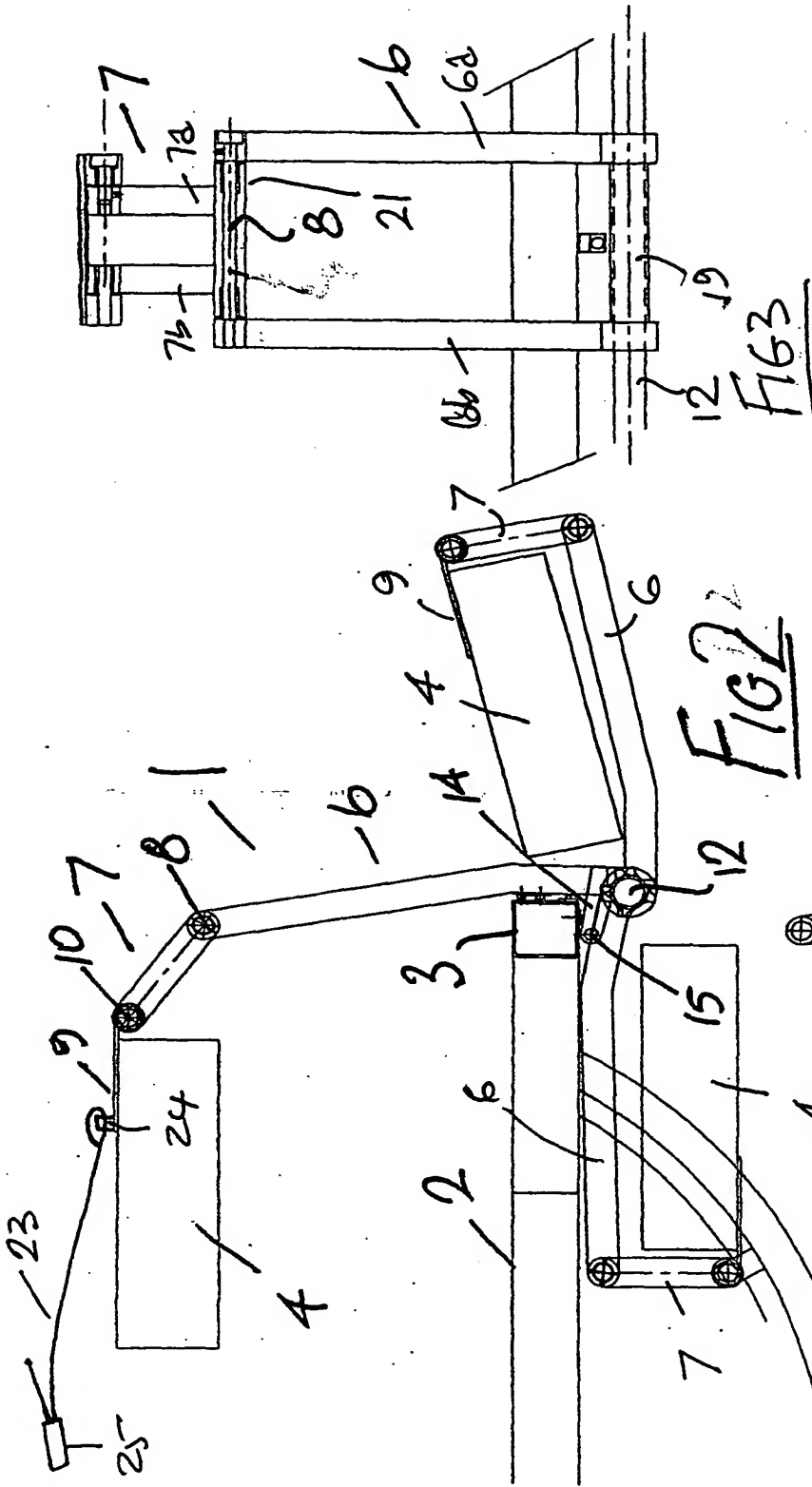
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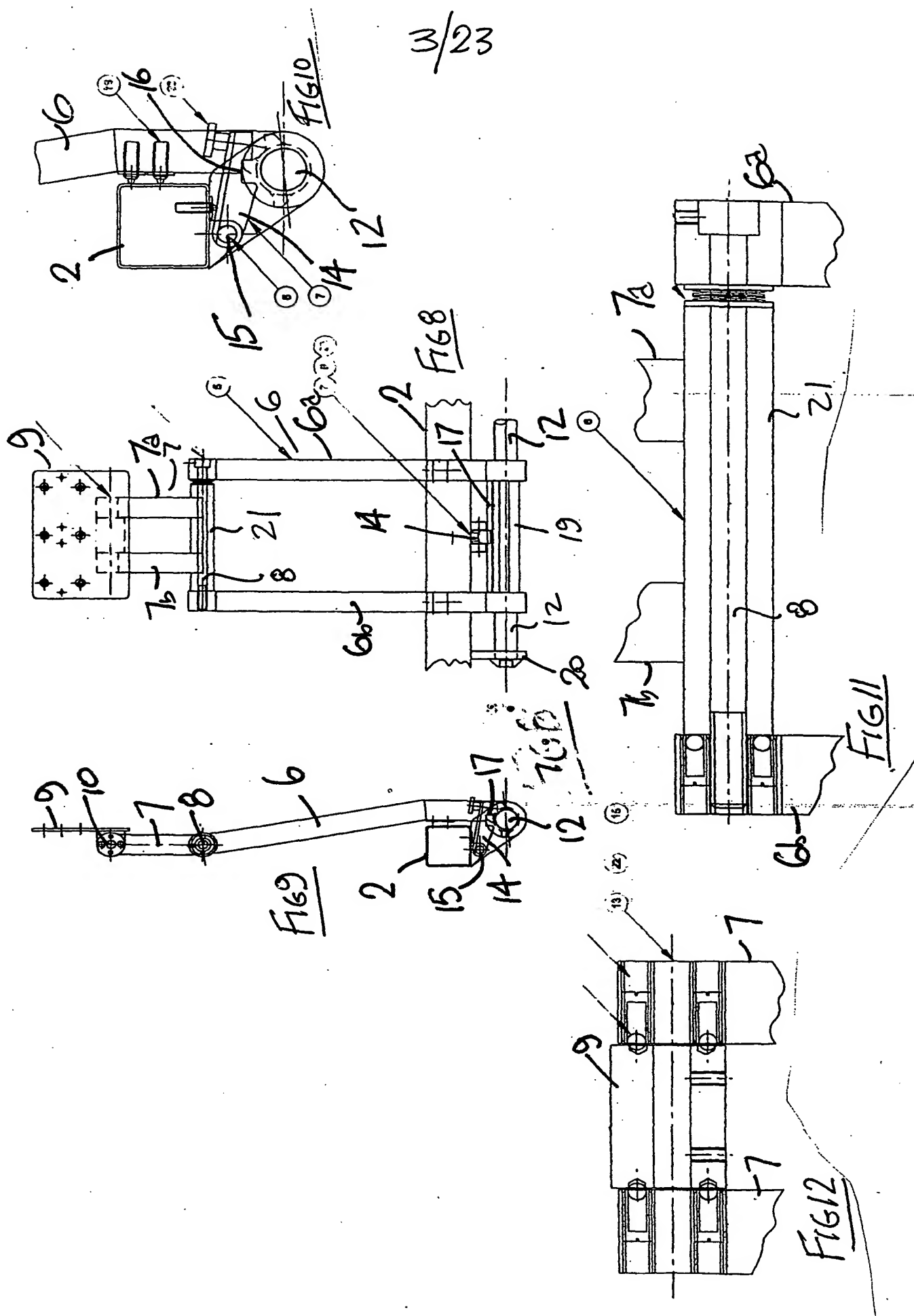
Prior Art

FIG 1

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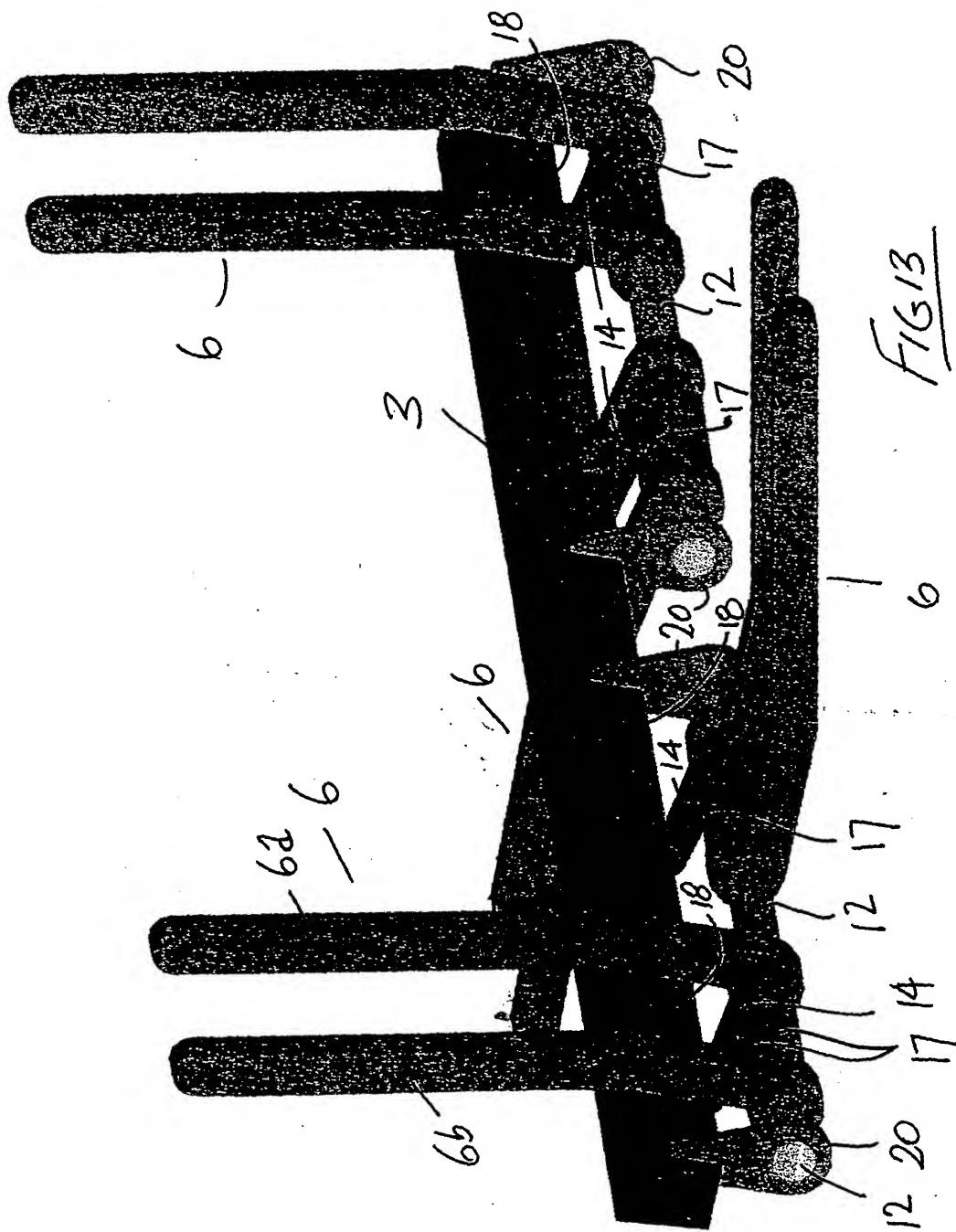


FIG. 13



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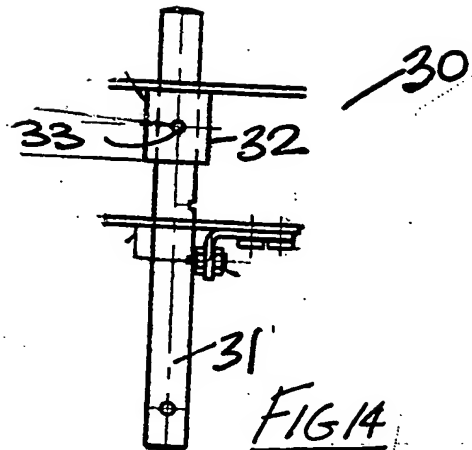


FIG 14

FIG 14 IS A  
SECTIONAL VIEW

FIG 15

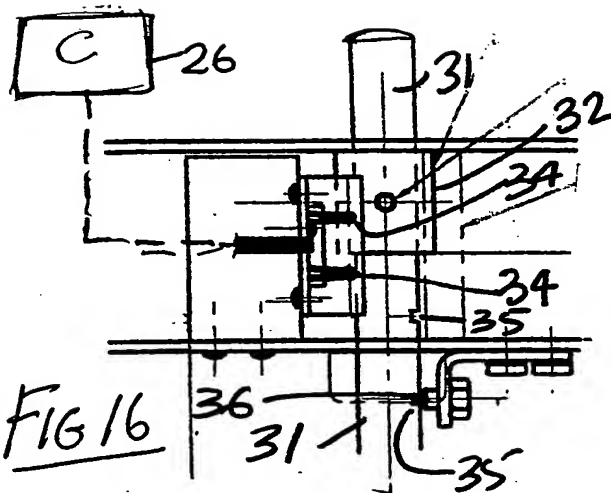
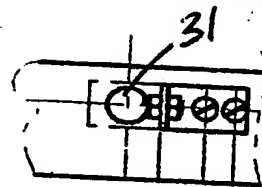


FIG 16

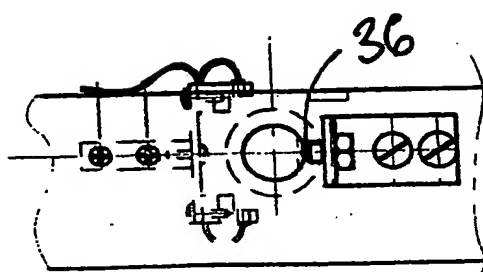
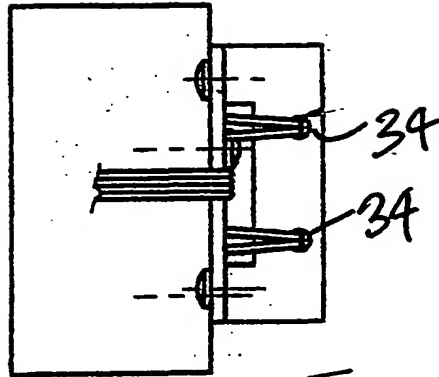
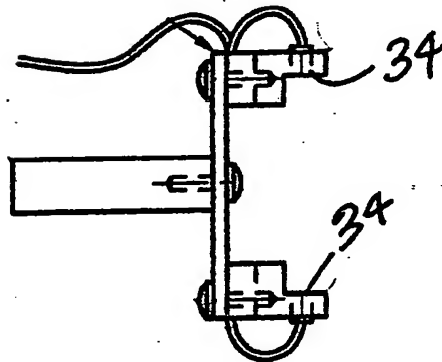


FIG 17

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FIG 18FIG 19

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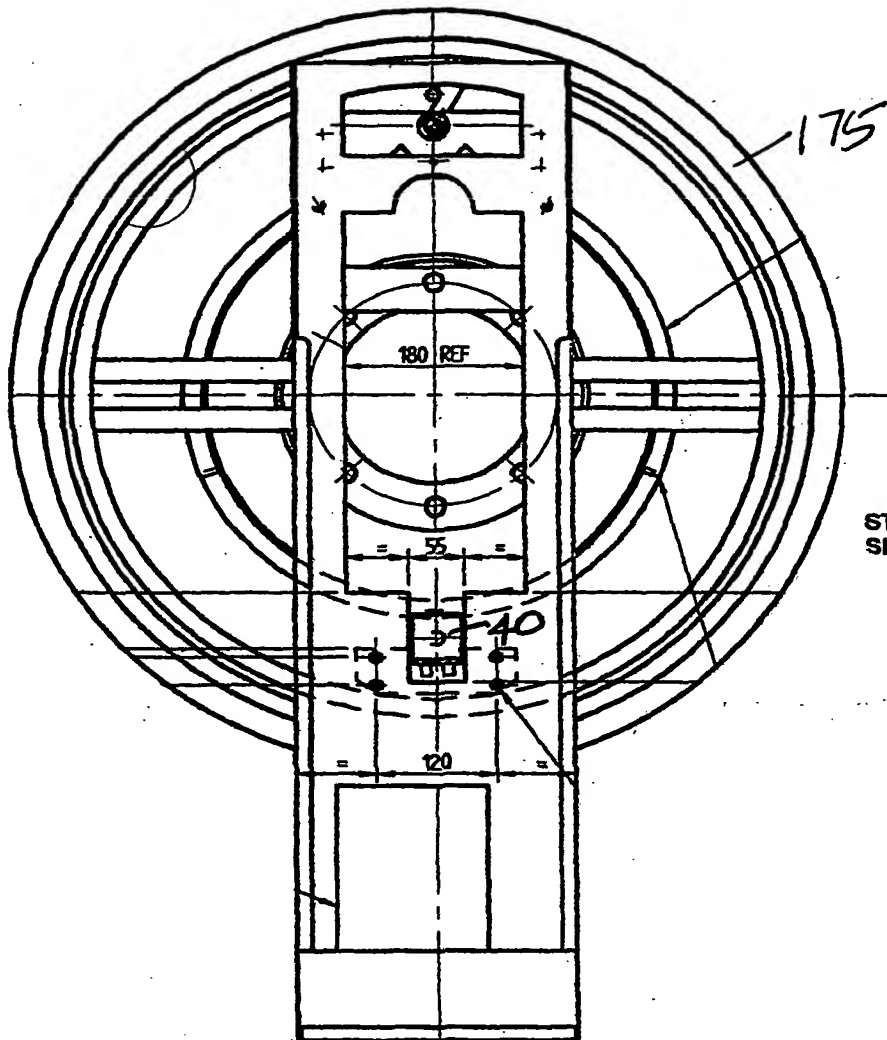


FIG 20

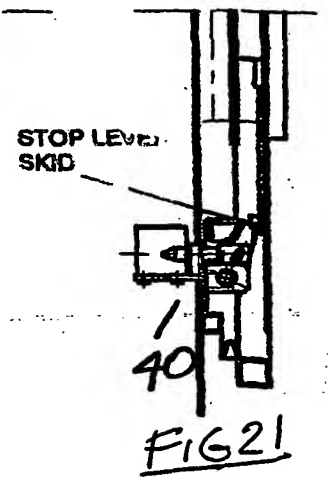
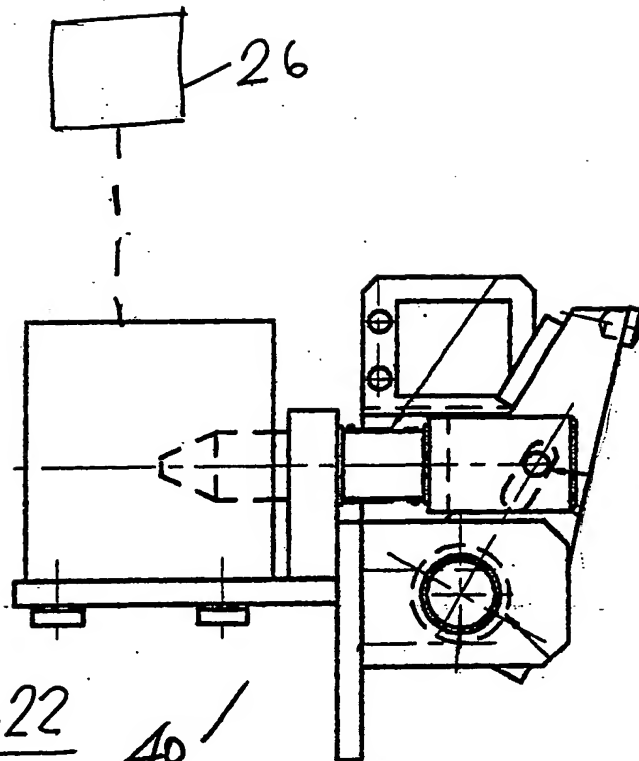


FIG 21

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FIG 22 40/

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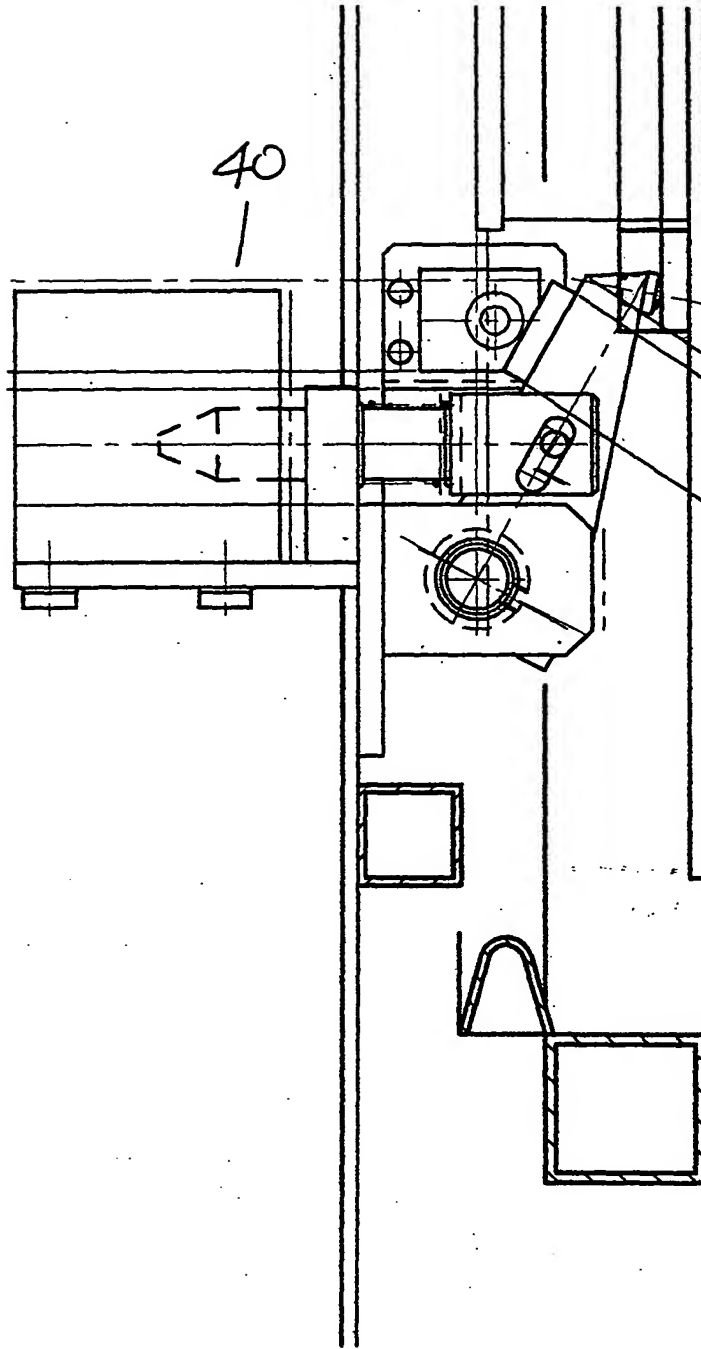


FIG 23

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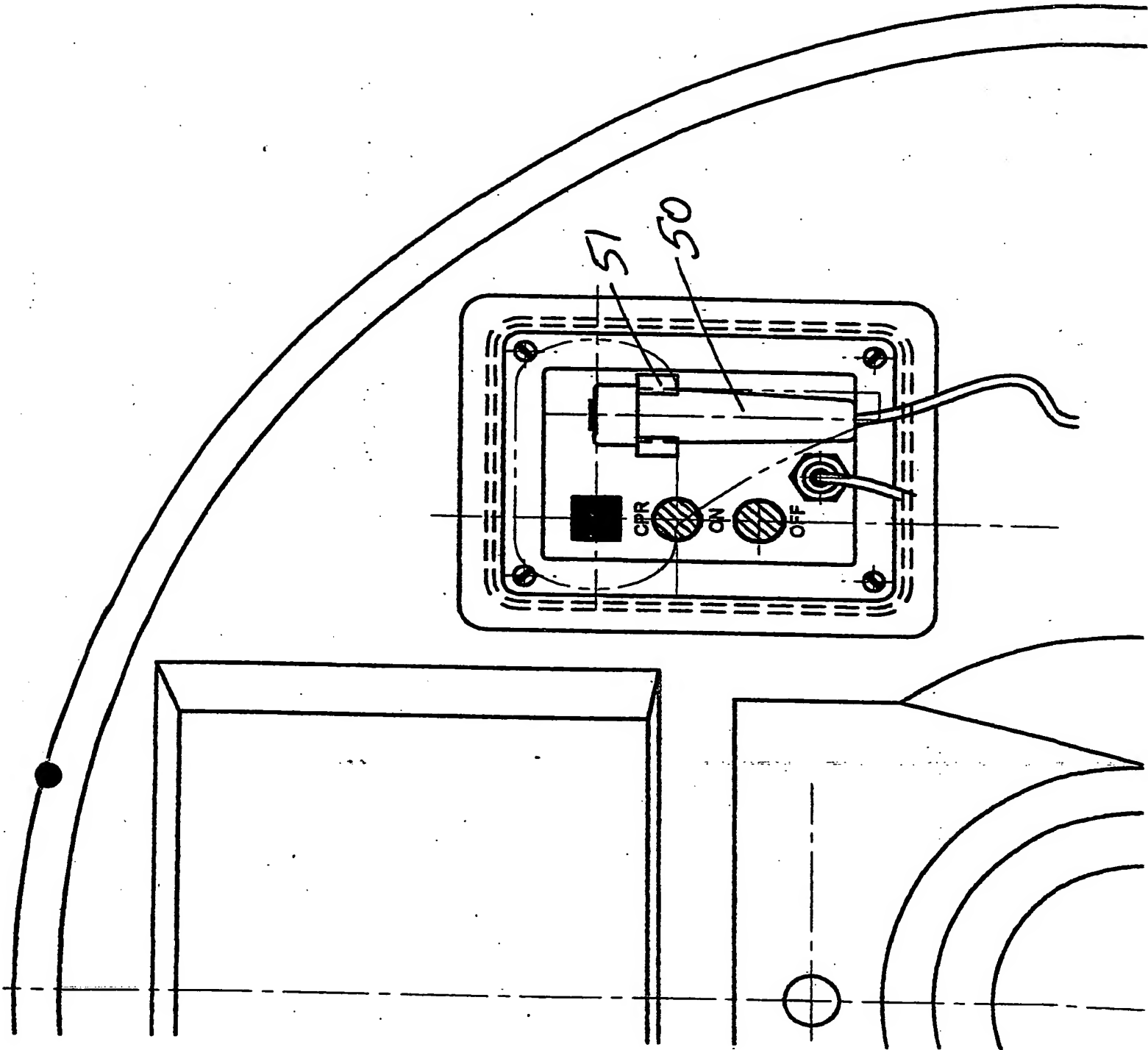


FIG 24.

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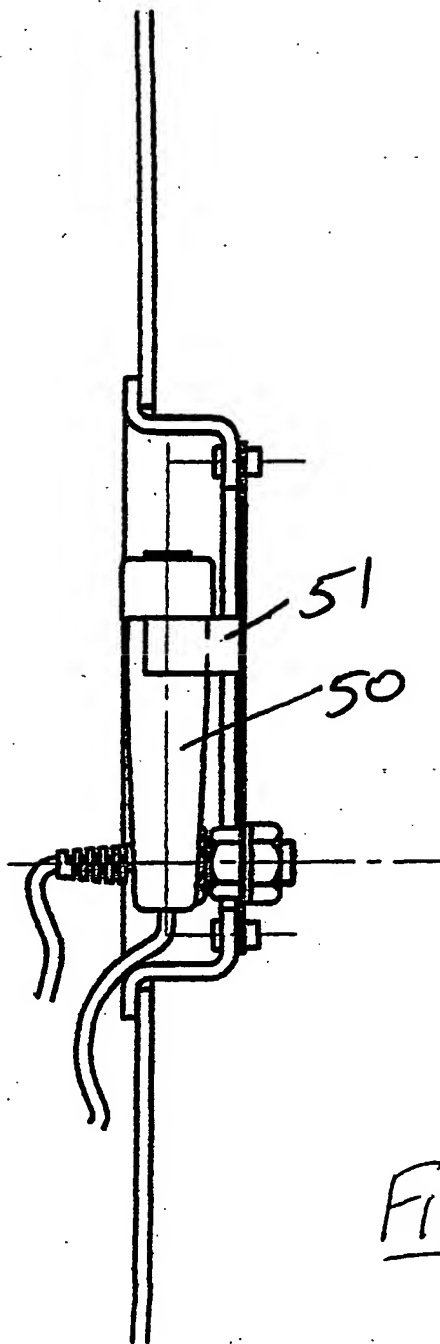
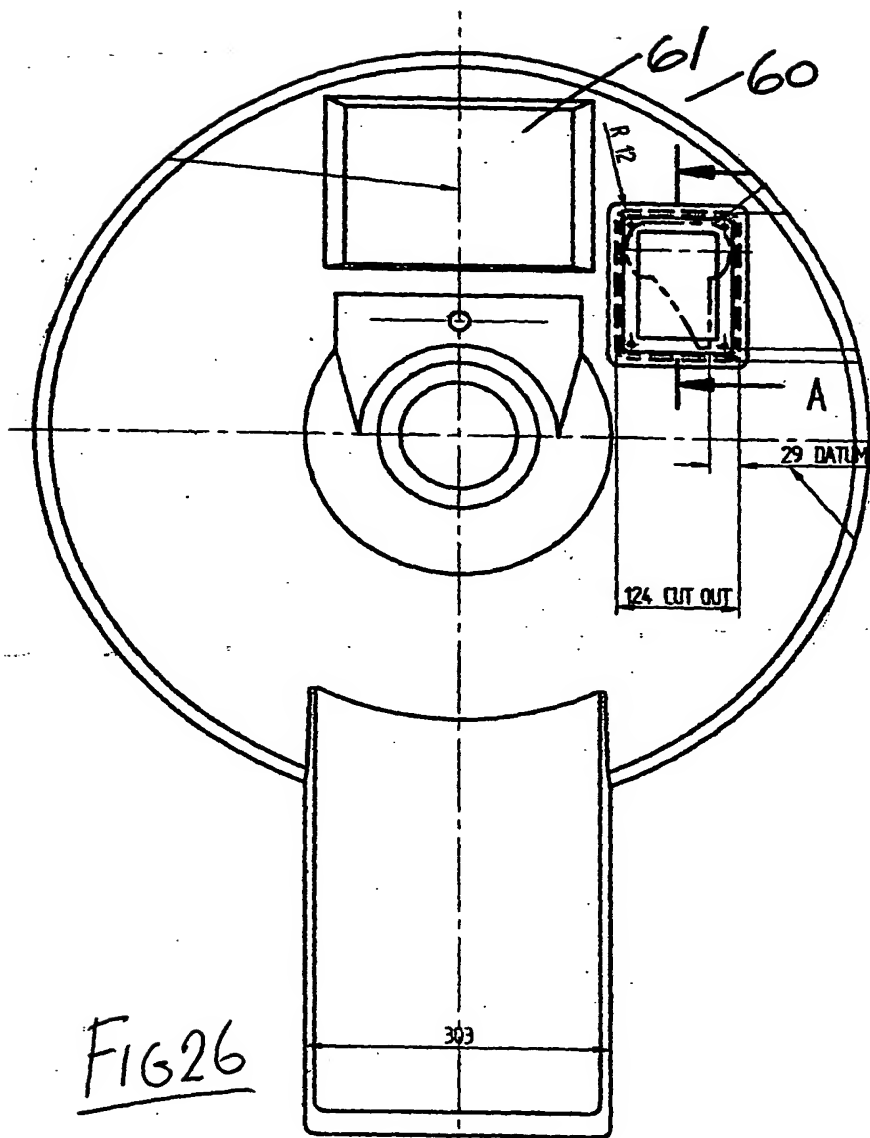


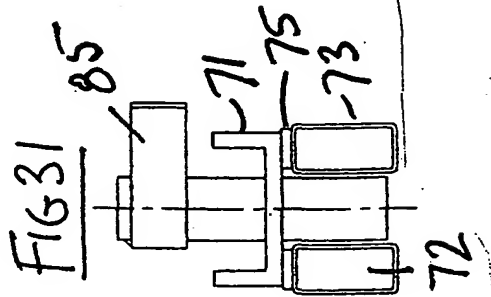
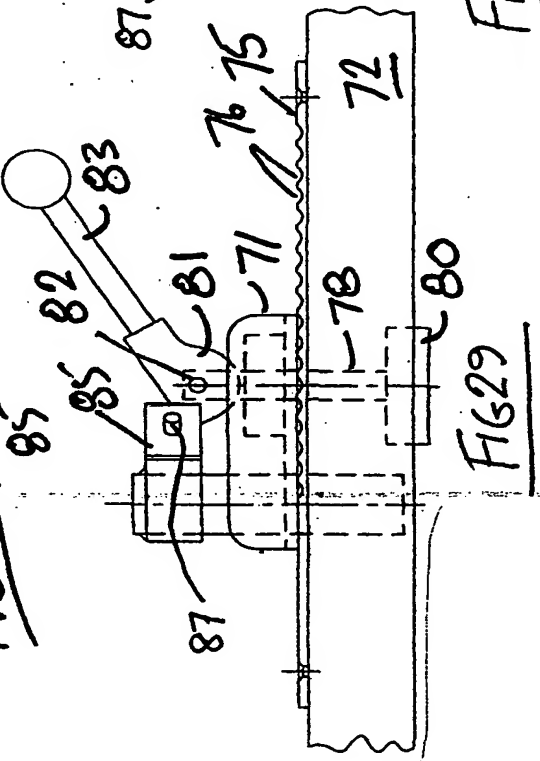
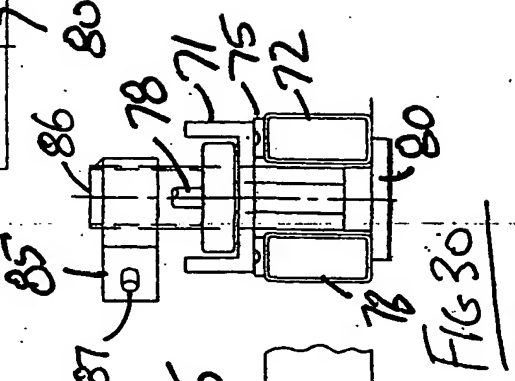
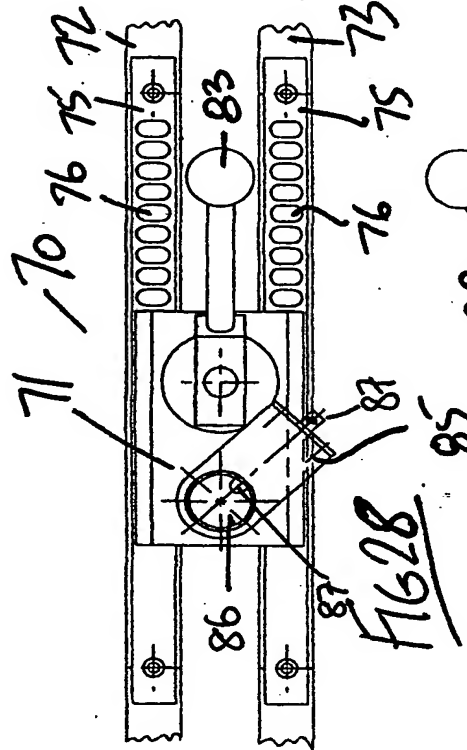
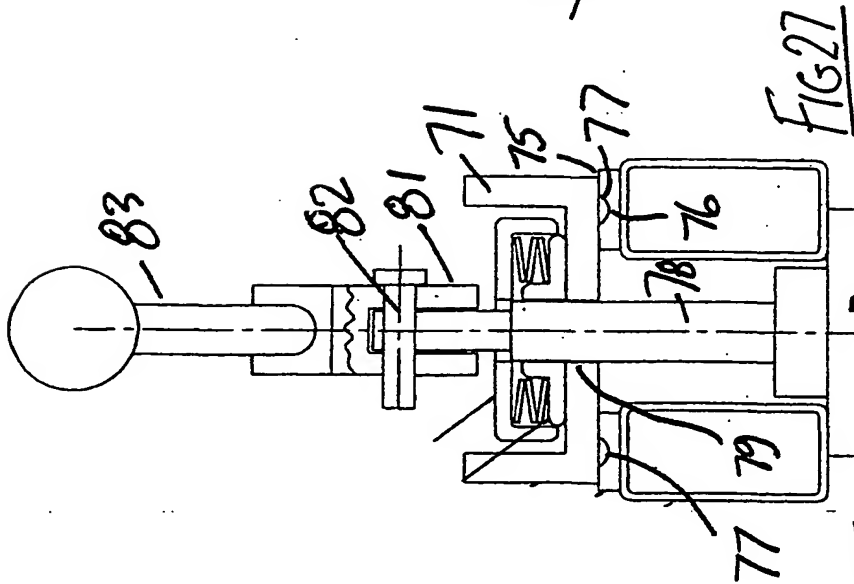
FIG 25

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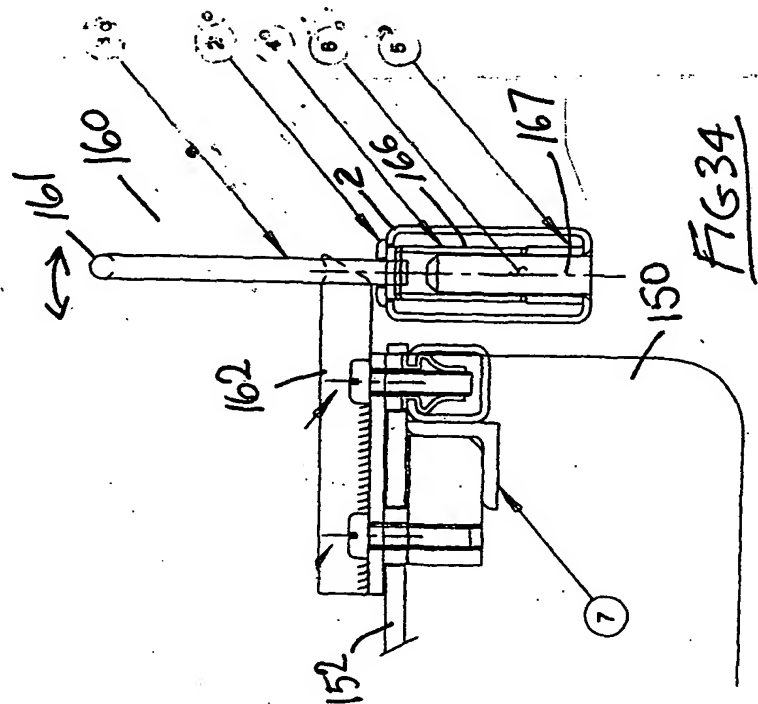
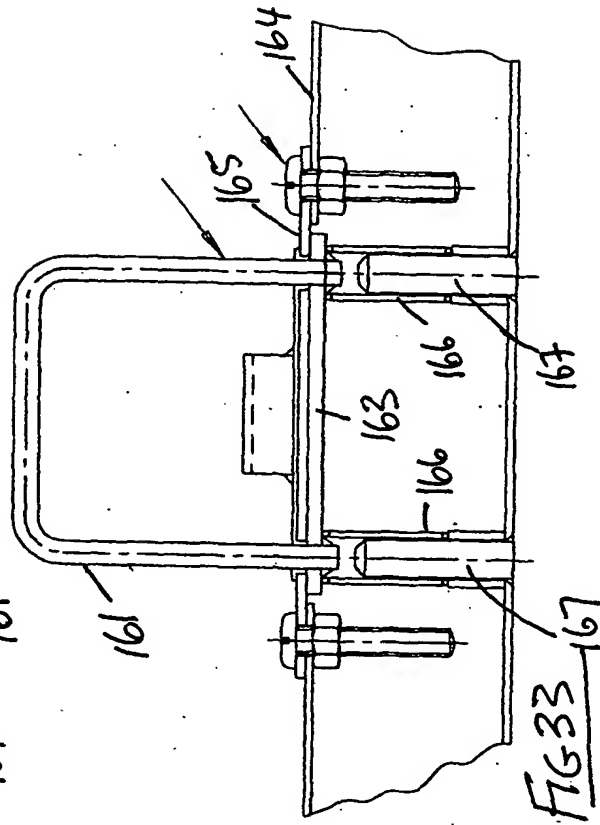
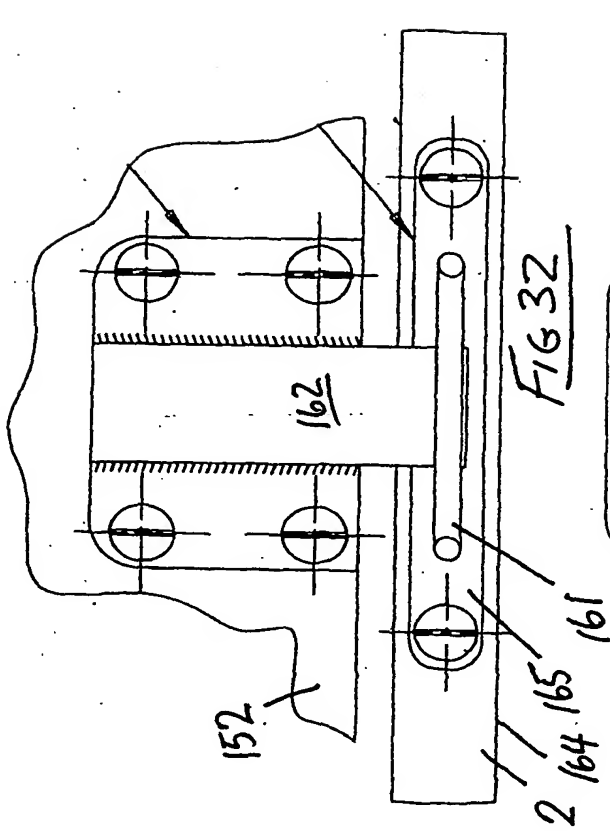




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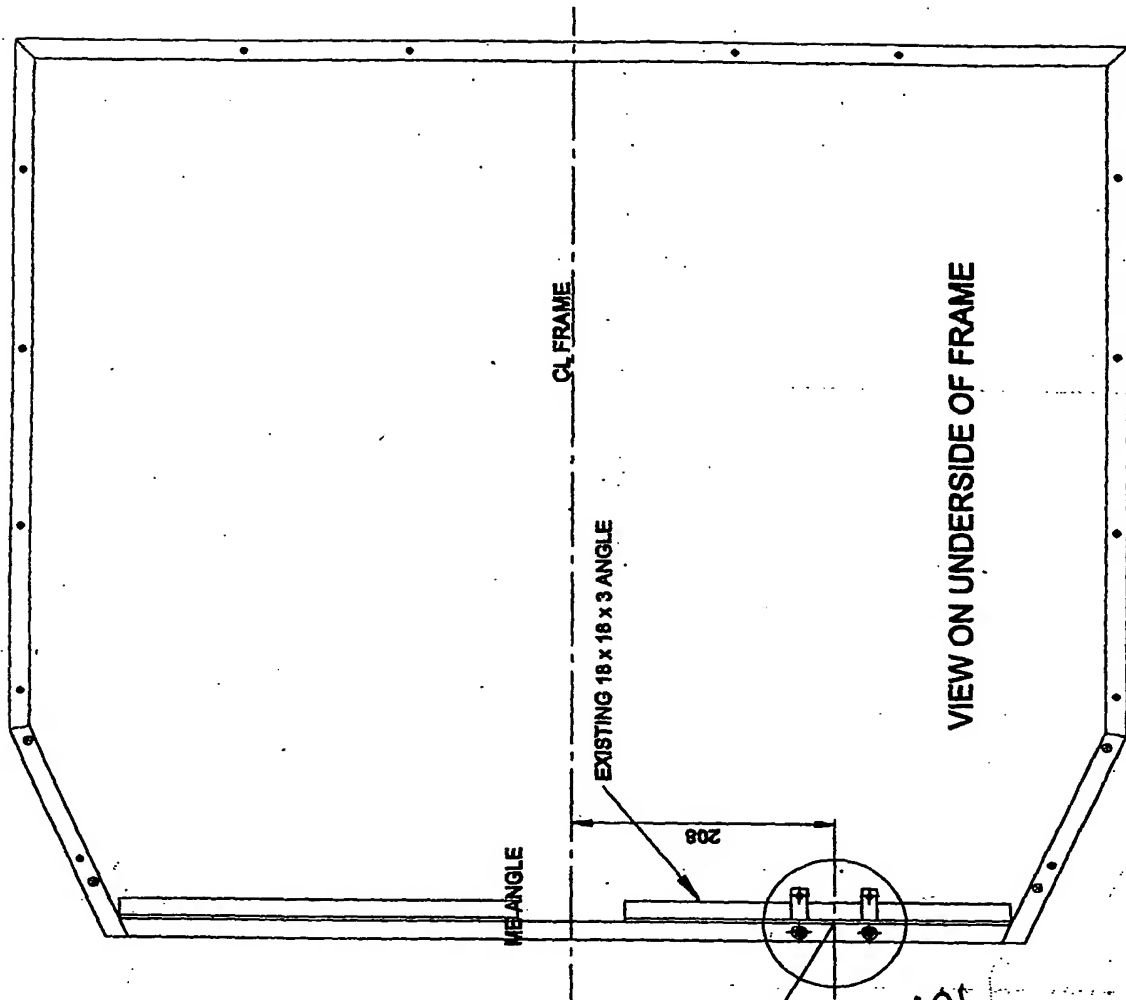
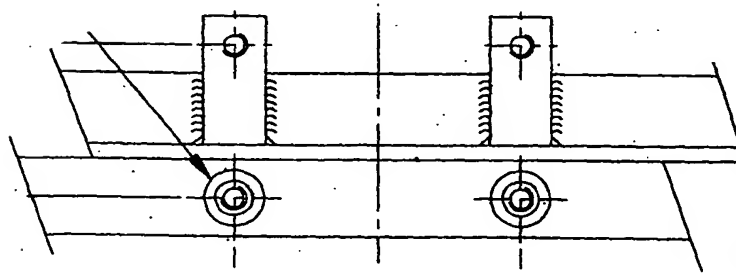


FIG 35



PATIENT SIDE OF FRAME

FIG 37

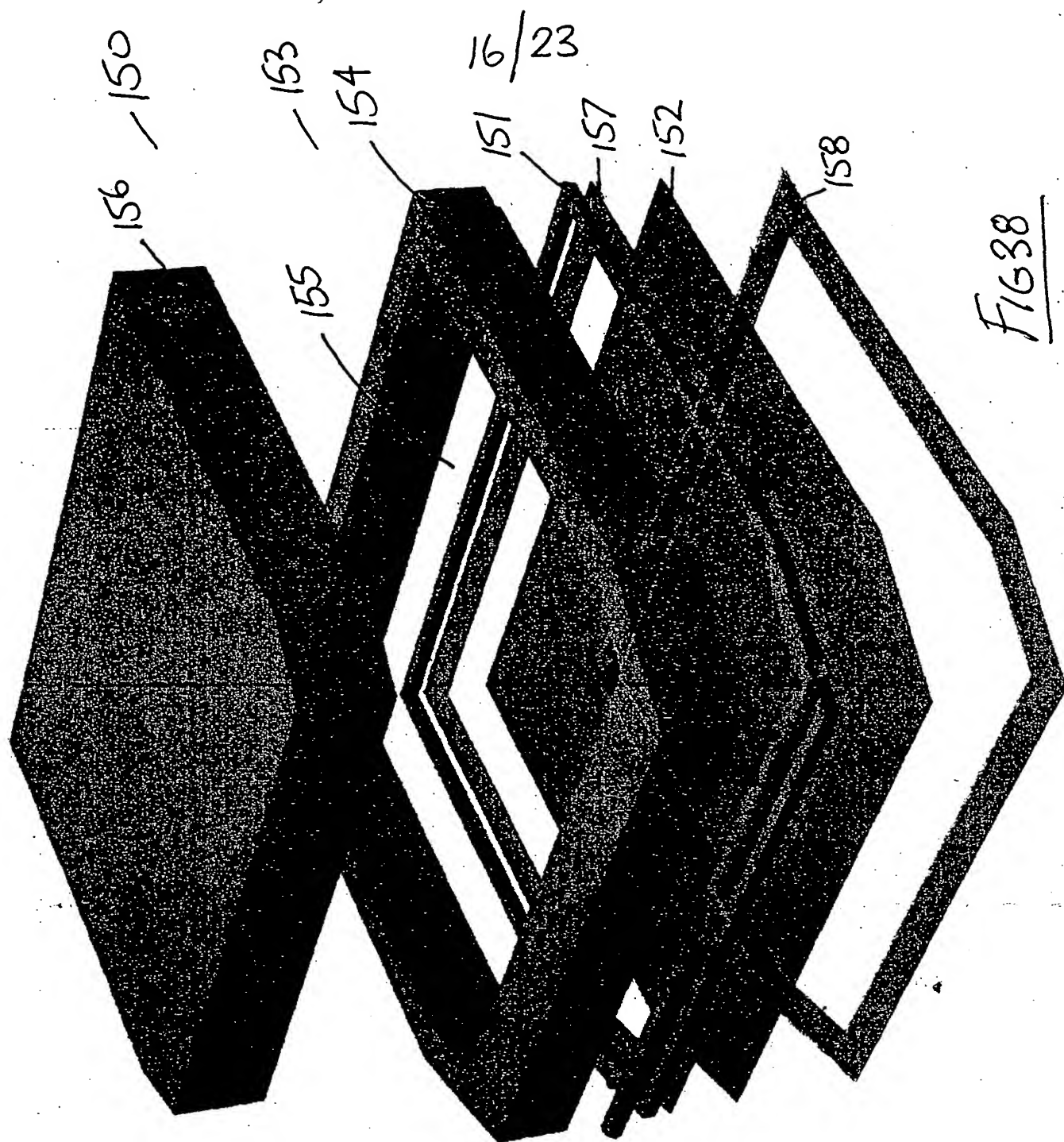
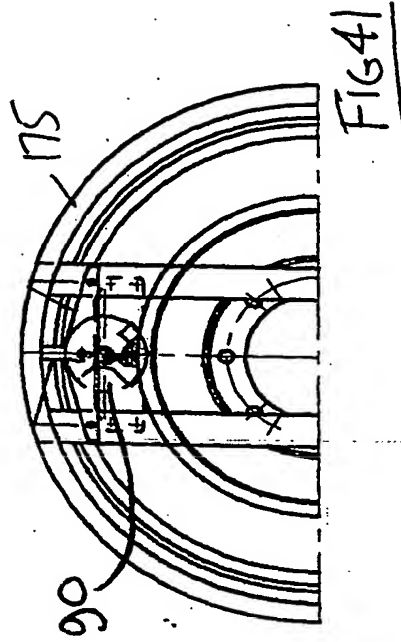
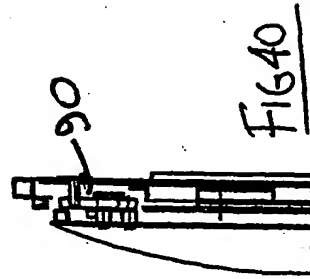
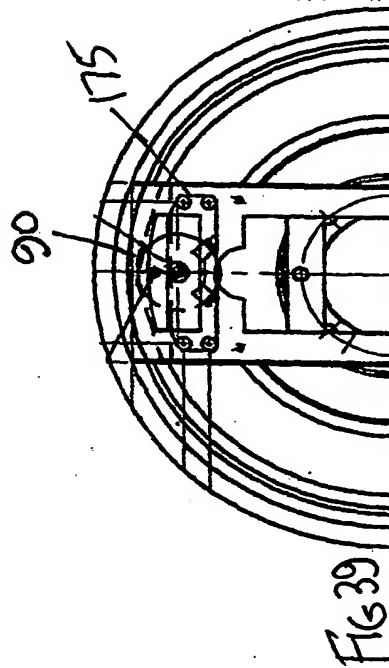
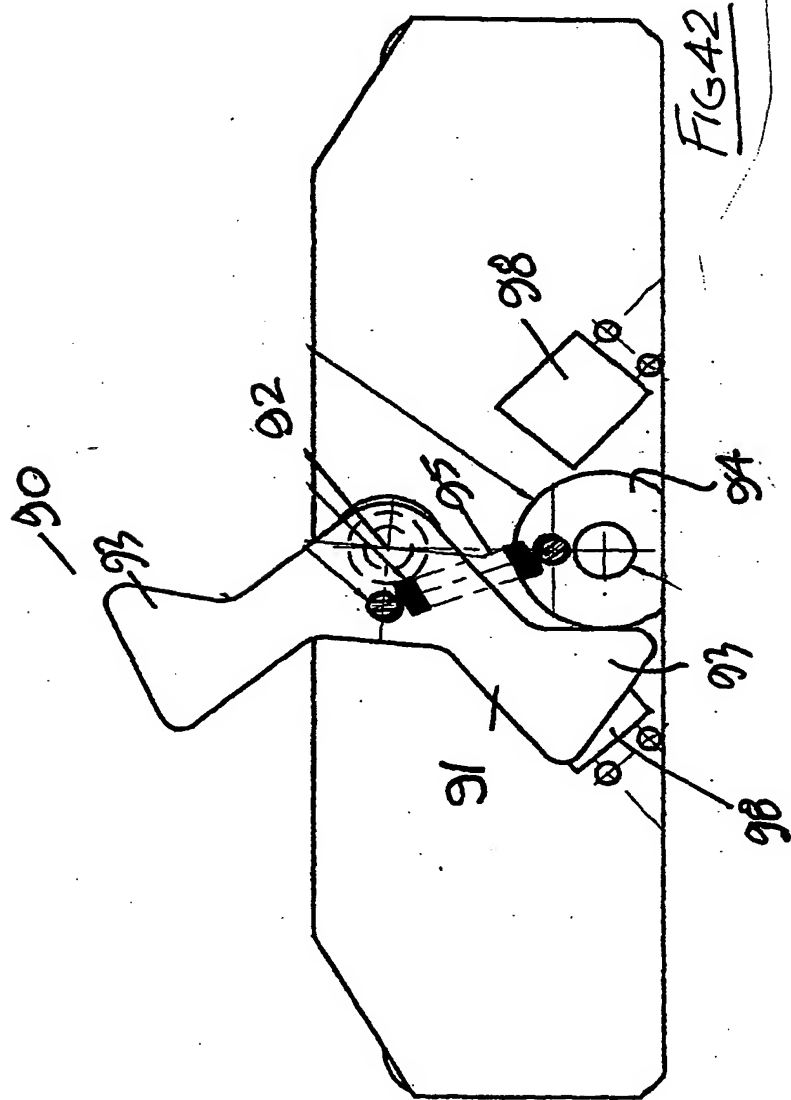
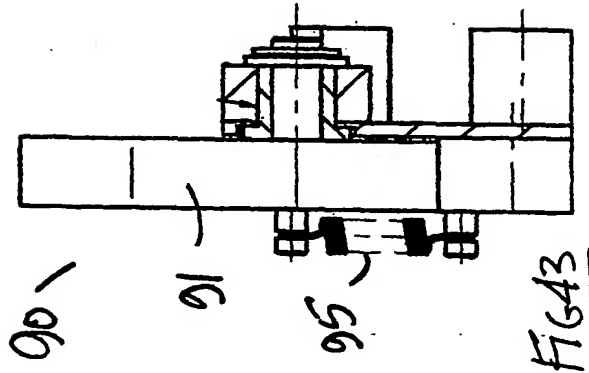


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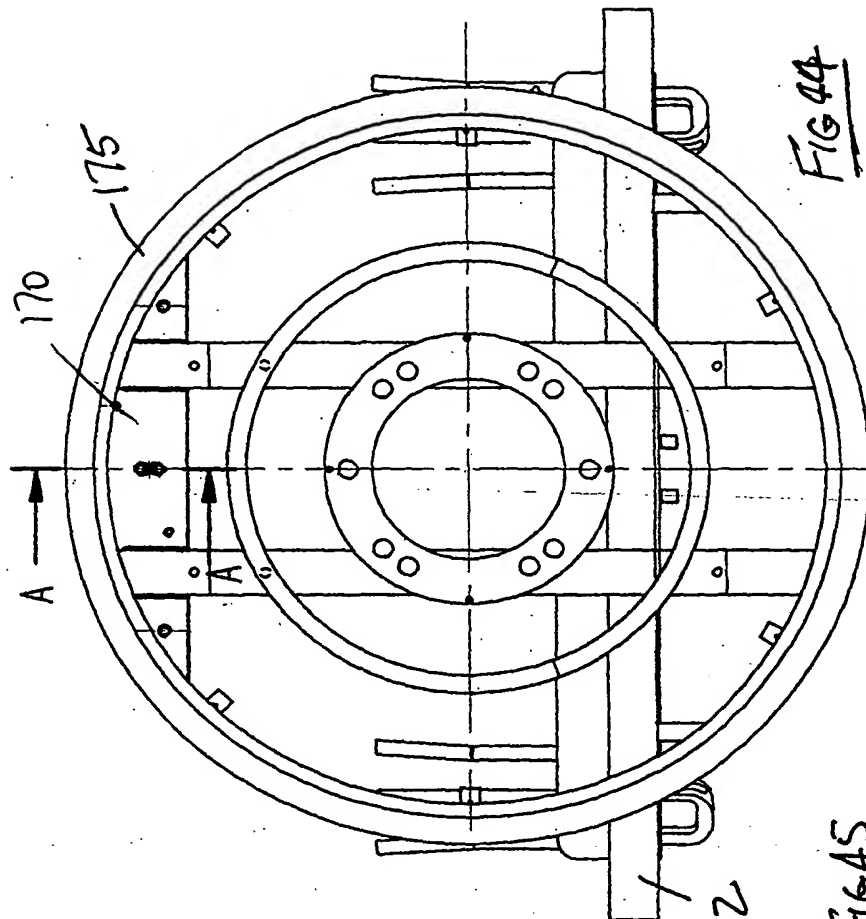


FIG 44

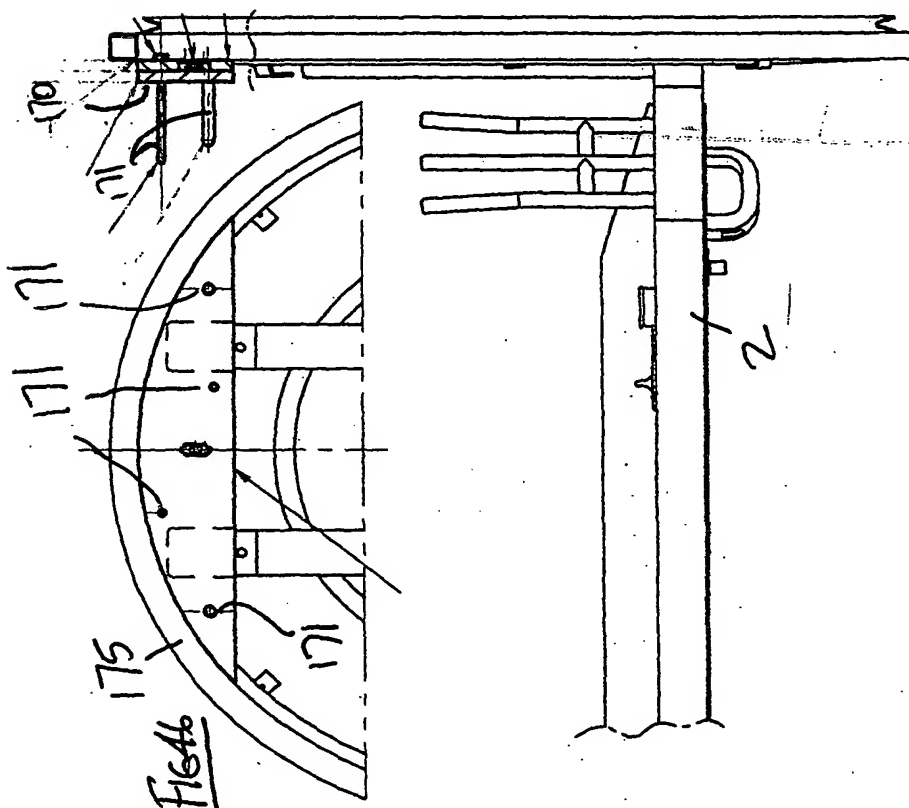
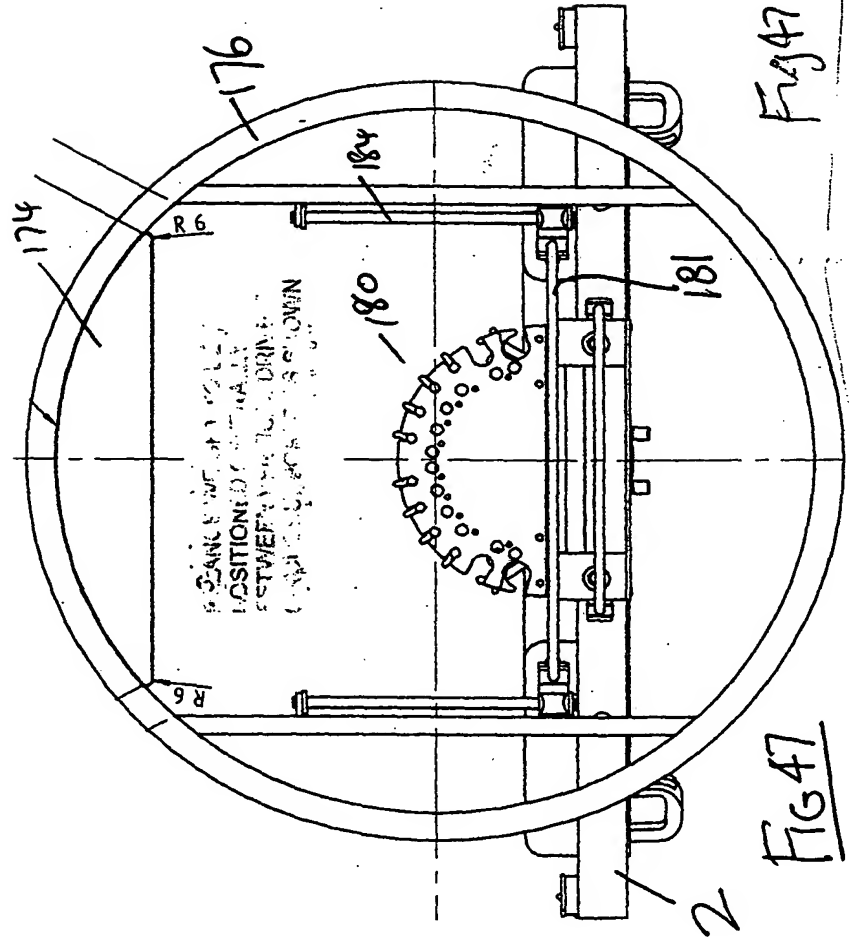
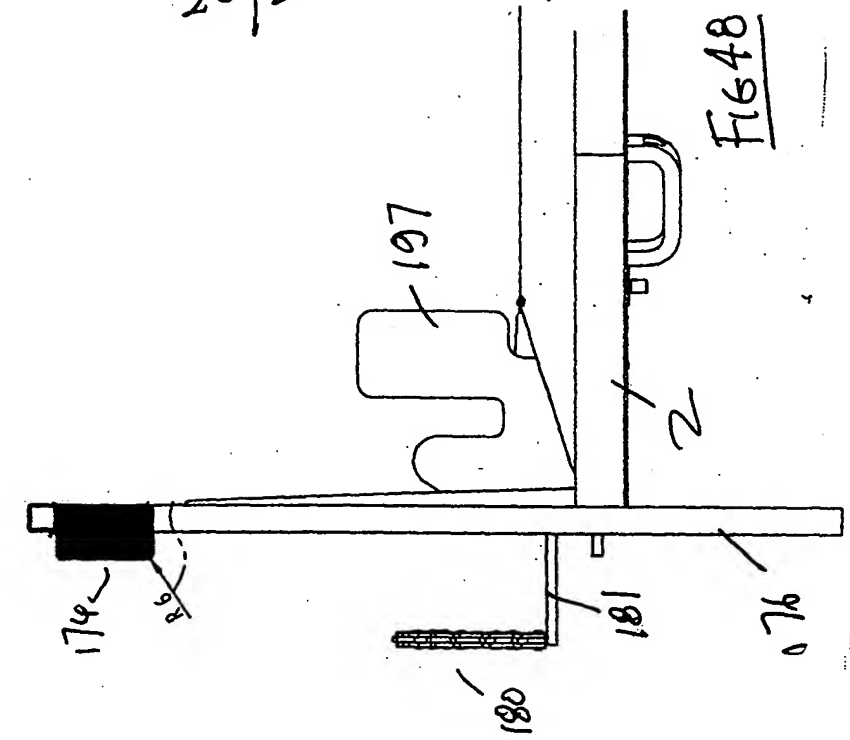


FIG 45

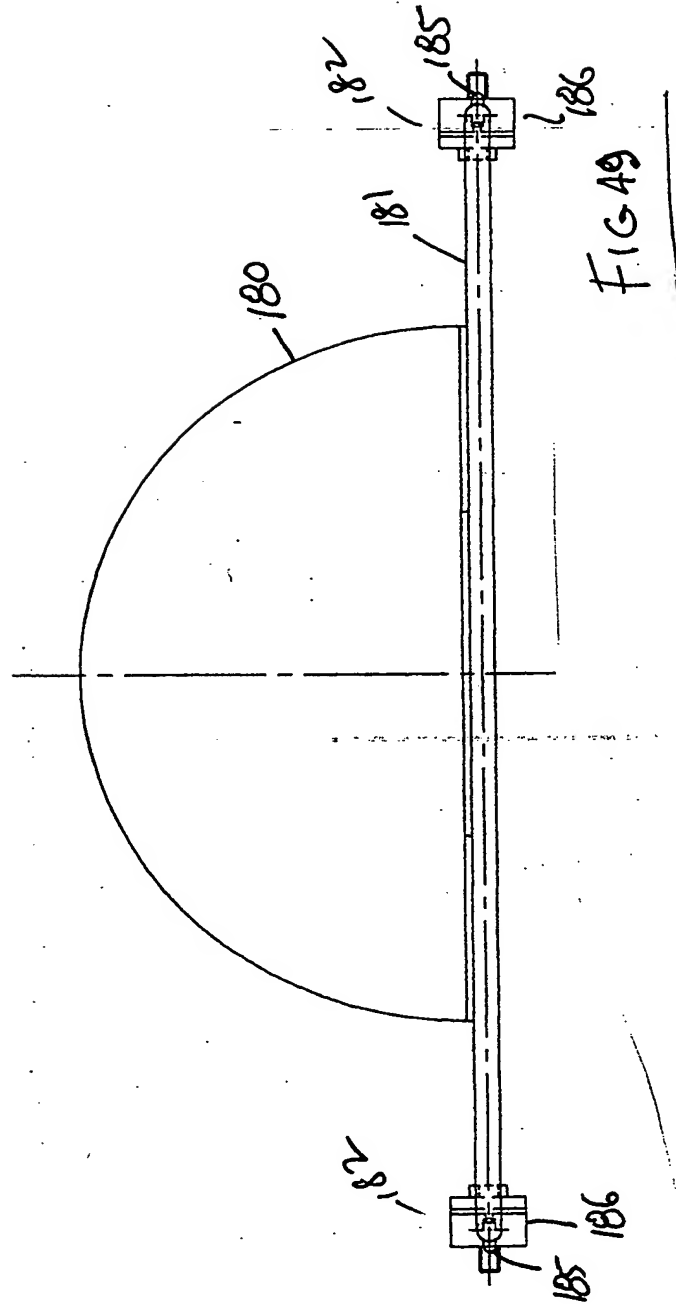
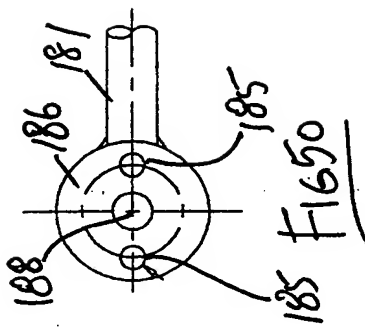
FIG 46

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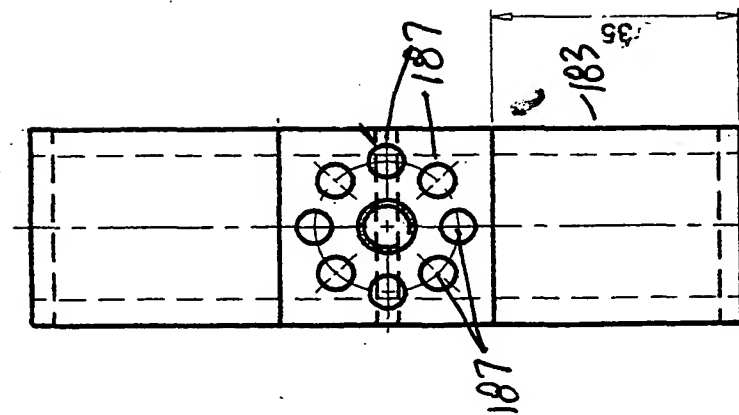
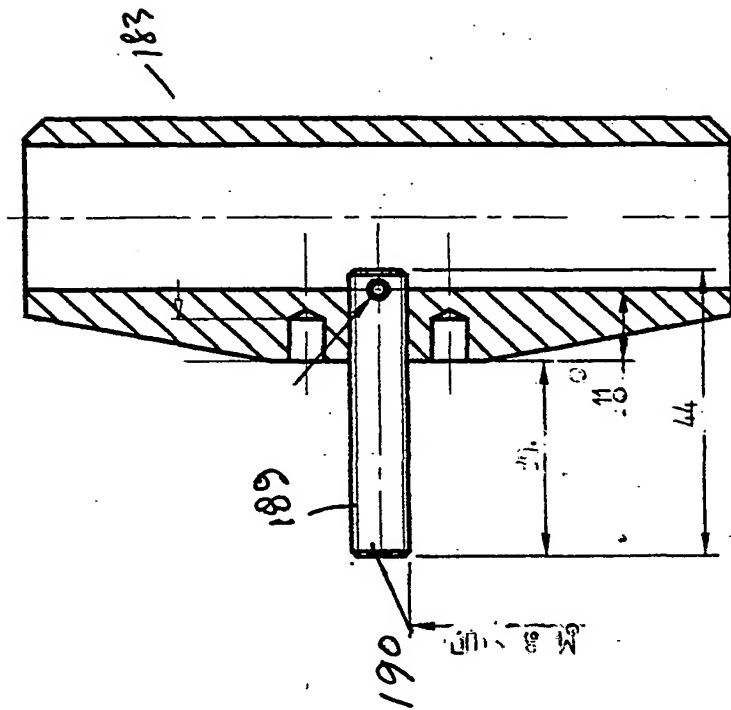




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